

AIRFIX

magazine

for modellers

October 1981

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AIRFIX magazine

for modellers

Volume 23

No. 2

October 1981

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Officials and fire crew inspect RCN Tracker 1528 after its 'text book' forced landing at Patricia Bay Air Station in 1969. A. Clarke recalls the incident and describes the aircraft and its colour scheme on page 57 (photo by A. Clarke).

On the cover

Atlantiques have served the French and Dutch navies well for many years in the maritime patrol role. Now the ANG version is updating the design for the 1980s. Aside from new avionics and revised detection equipment, external changes include a fin-tip ESM pod and an infra-red scanner beneath the nose. In a characteristic setting, one of the Atlantique ANG prototypes sweeps in over the French coastline. Heller produce basic Atlantique kits for those who wish to convert.

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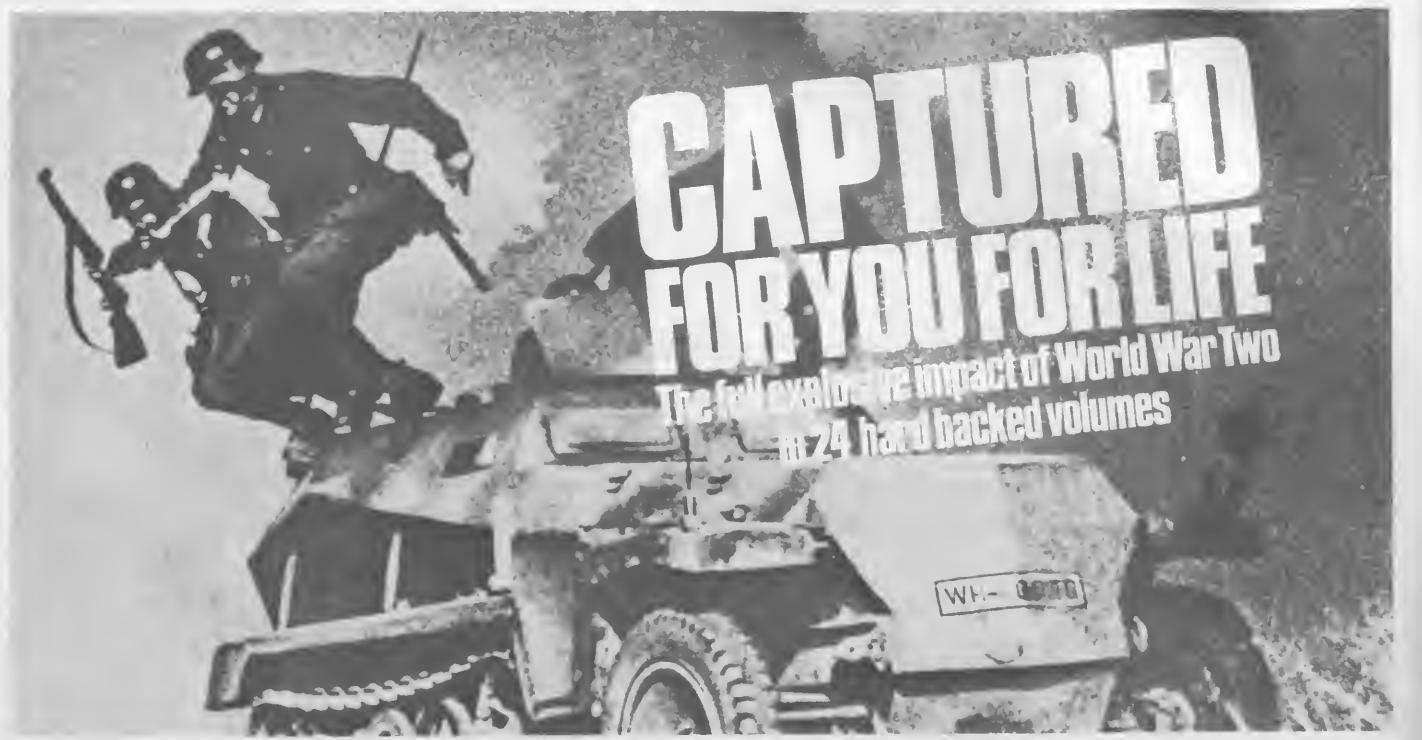
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Canadian Tracker

One of our Canadian readers sent this memory of an incident which also supplies useful colour scheme references for the Tracker as used by the RCN at the time. Hasegawa make a good 1:72 scale Tracker kit.

This incident which occurred in 1969 at the Patricia Bay Air Station located 20 miles north of Victoria, BC, was the crash landing of a Tracker aircraft of VU 33 Sqdn of the Royal Canadian Navy. Fortunately no one was injured in the crash. The locale in itself may bring back old memories as the Pat Bay Air Station was once the home of several RAF OTUs then operating Ansons Hampdens, Blenheims and Beauforts.

Tracker 1528 was returning to base from a training flight when its undercarriage hung up. Violent manoeuvring failed to shake it loose and it steadfastly refused to budge. After circling the field for several hours to burn off fuel and, at the same time enable the Naval Fire Dept. to foam down the runway, the Tracker came in on the foam at what was described as a text book landing.

Little damage occurred to the machine other than a lacerated belly caused when she ran out of foam and skidded along the pavement in a shower of sparks. The pilot held her on an even keel to the bitter end and when all forward motion was lost, the craft just settled over on her side. Note that the propeller blades were not even bent.

Rather than try to explain the colour scheme, I have sketched a view from the photographs. Two months later, the aircraft was back in operational service.

As a police officer when this happened, I was a member of the Identification Branch called in to cover the event by photograph. The photos were used in the board of inquiry which followed.

A. Clarke

**Editor's
Notebook**

'Not another Phantom!', I hear you cry as you see Gary Byk's article in this issue.

We seem to have run endless Phantom articles lately but that is because the good old F-4 is a classic in its own lifetime, like such types as the

Canberra, Spitfire, Mustang, Thunderbolt, and many others before it. So not only are lots of enthusiasts coming

up with new areas of research, new pictures, and the like, but the aircraft itself turns up in all sorts of guises and in numerous ownership and colour scheme variations. A good example is the

RAAF Phantom which is an interesting variant in its modest way and which Gary Byk puts on record for us this issue. It offers something different again in the way of markings. This clears our immediate files of Phantom material, but we always like more if it covers new or little-known areas of information on the aircraft. And while on the subject of the Phantom, one observant reader takes us to task for our review of Hasegawa's 5,000th Phantom model in the August 1981 issue, page 594. We said it was just the previous F-4E kit with new markings, but apparently Hasegawa have done more than that, providing new wing mouldings which are correct for the 5,000th machine. We made some mistaken assumptions on this, mainly through never actually having earlier Hasegawa Phantom kits to hand for comparison. Our mistake, and we did an injustice to Hasegawa here. Kits of Phantoms are numerous, of course, and if you haven't got a Phantom model in your collection yet, make amends with the RAAF version described this month.

Now we are off on a new Harrier article which should sort out all variants and colour schemes in RAF service to date — a much requested feature from readers even though the Harrier is a familiar enough type. Fact is that this aircraft has been long enough in service now for its earlier styles and colour schemes to look distinctly 'vintage'.

Next issue we hope to continue with the flamethrower story, but we have a Viking ship modelling article, the first German aircraft in 'Combat Colours', and the Bristol Bulldog story. Plus a conversion/modelling article getting the correct details for HMS Hood, a subject which has confused modellers in the past. Meet us next time.

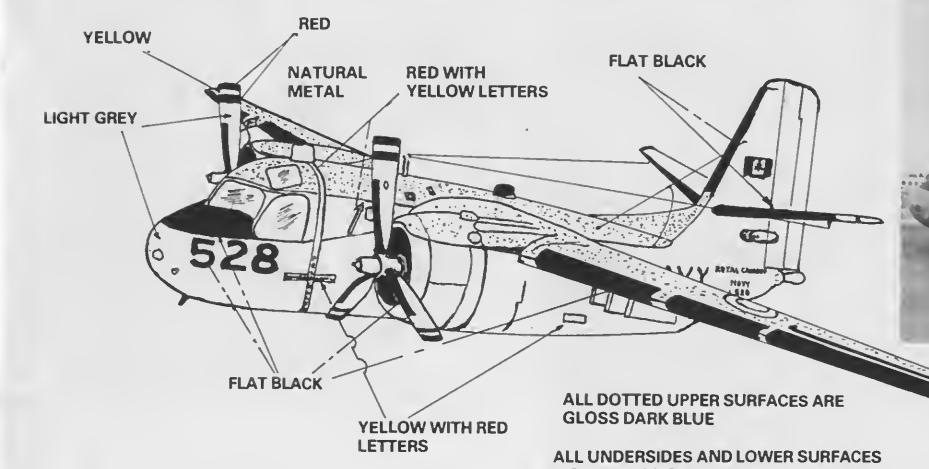
Chris Ellis



The final approach. Committed with engines off and props barely turning. Just about to touch the foam.



Close up shows detail and markings.



Moments after stopping with the Naval foam truck standing by. The crew escaped via the opening hatch above the cockpit, then ran like hell along the wing to the ground.

The outbreak of War on September 3 1939 had little immediate effect on the Army, in its role as Imperial Policemen. The BEF which went to France comprised of Regular soldiers from the UK plus Territorial Divisions, and few Regular Units returned home immediately. In June 1940, after the BEF had left the Continent of Europe, the focus was on Egypt and Middle East Commands, and troop movements were in that direction.

The Indian Sub-Continent stirred, and by then had produced the matchless 4th and 5th Divisions. They arrived in the Middle East as well-seasoned troops, many of the soldiers having been broken in to warfare on the North-West Frontier. They arrived well equipped and well armed: they completed their complements with British Battalions locally stationed (each Indian Brigade had one British Battalion with the two Indian Battalions). In fact, at one time, the 4th Indian was the only Formation of Divisional strength under Middle East Command.

The Indian influence soon began to make its presence felt, and dress regu-



Xmas Day 1942. Note short sleeved (day time) shirt on the left: Long sleeved shirt in centre. On the right, locally made short sleeved bush jacket without belt. Short (South African) pattern shorts. Locally purchased slacks, stockings and shoes. We were hung-over from the previous night.

they were long shorts or short longs). One pair of khaki drill slacks, of a cut so narrow, they would have been greatly admired by a 1950s Teddy Boy. Two pairs of hose tops, woollen knitted. One helmet in papier machine, khaki drill covered, with top ventilator, puggaree, lined with green baize.

The tunic bore the usual Ordnance tab sewn in, with the name of the manufacturer and the year. Mine was made in 1923. We tried them on in the Barrack room, and admired ourselves greatly, likening ourselves to Sanders of the River or Big White Carstairs, the renowned Beachcomber character. In fact we looked like the concert party in 'It ain't 'arf 'ot, Mum'. In the course of our journey, we spent some time in Cape Town, where the ever hospitable South Africans took us into their homes. They didn't laugh at our gear—their natural politeness stopped that happening. But I am sure they must have thought that the UK could have done their soldiers a little better than that. The South Africans had some excellent clothing for their Union Defence Force, and in Adderley Street Cape Town, I purchased some very good shorts and shirts which I wore during my Indian service, having the Indian tailor copy them. They were truly short shorts, of comfortable cut and very cool to wear. Tropical nights can be coolly misleading, and they tend to bring out our little biting friends, like mosquitoes. Hence, the rule after sundown was long sleeves and long trousers. In the desert, the evening problem was more usually the drop in temperature, and warmer gear was the rule.

The carefully regimented standard of dress began to undergo metamorphosis, under the influence of desert warfare, and styles began to reflect the personalities of the units—especially among the cavalry units. Cord trousers, regimental scarves, and regimental dress caps were the vogue, with crepe soled half boots for foot wear. They had a name—but perhaps not for publication among the younger readership of this magazine. When a unit is on operations up in the blue, the main demand on the transport is always for food, fuel and ammunition, so dress styles were not high on the level of regimentally inclined Sergeant-Majors. The modeller can have a veritable field day with unorthodoxy running wild. Almost anything goes in dress—but not in arms or equipment—those stayed fairly standard.

By the start of 1942, the Middle East Base was well established, and much of the clothing was sent up from India—cotton shorts, slacks, shirts, webbing, boots and some small arms. Indian industry was expanding and coping well with the kitting out of the many new Indian Divisions being formed for the Defence of the Homeland. GHQ Delhi produced one or two horrors. There was the Indian pattern shorts cut so wide and long, you could



Australian Tank crews pause for photographs during the advance on Tobruk, January 1941. Note Tank Corps berets and crouching infantry with fixed bayonets.



A Rifle Brigade truck operating as part of an Advanced Motor Column in mid 1942. It's crew demonstrate the motley and individual styles of dress adopted in the desert, ranging from shorts, no shirt to shirt with sleeves rolled down.

restrictive clothing: the wearing of the bush-shirt outside the shorts certainly helped with the circulation of air round the body, and brought considerable relief from the painful malady.

The Khaki jersey was a most useful piece of issued cold weather dress, and we, of course, took our UK issued jerseys with us. The Indian Army had a far superior garment, with slots and holes in the shoulders so that shirt tabs could be passed through, and regimental titles

— and for the Officers badges of rank — could be shown. They also had a single button at the 'Vee'. It was the conceit of the newly arrived to 'organise' an Indian Pattern jersey—if only to show off to the next arriving draft from the UK what a veteran of the Indian scene you were. Not that it really fooled anyone. The whiteness of the knee gave the game away completely. 'Get your knees brown' was the mocking cry from the veteran to the tyro. In fact, I recall with delight the call of a very famous cricketer (England and Middlesex) encouraging his team with the cry 'Don't shoot 'til you see the white of their knees' as his lot played soccer against a team of New Boys. The order of things was changing. In December 1941 there occurred the shattering attack on Pearl Harbour, and the subsequent Japanese expansion over the Dutch East Indies, the Philippines, Malaya and Burma. Hong-Kong fell. A new sort of war had come to a totally new theatre of war. The carefully thought out scales of equipment, and the designs for desert war now had to change. Units in those heavily wooded areas were wearing khaki drill clothing—a perfect target against the green of the trees and rubber plantations.

New thinking was urgently required. And eventually there arrived the Jungle green battledress, in which the Australians in New Guinea and the 14th Army was first to stop the Japanese, and eventually to drive them from their early victories to a very thorough and final defeat. But that is another story.



shirts, cellular, khaki with shoulder tabs, and two breast pockets. Two pairs of khaki drill shorts, of execrable cut. (They couldn't make up their minds if Off-duty order. Daytime. Note short sleeved shirt: UK pattern shorts. Locally purchased long stockings and shoes. The cap is of the Corps colours—blue piped with red. The Sam Browne belt (no cross strap) was official dress for NCOs at that time.

lations and customs began to change. The British insistence on the wearing of sun-helmets waned, and few units wore sun-helmets in the desert, and units managed to function perfectly efficiently without that burdensome piece of equipment. The dress of the day was still KD shorts with shirts worn tucked in, with Ammunition boots, hose-tops and short puttees. The clothing worn by the Western Desert Force, which carried out the operations which led to the Italian debacle at Beda Fomm was in this range, the Force being formed of Units which happened to be in Egypt and the Middle East at the time—not forgetting the Armour which had been trained by the Great Hobo, and which afterwards gained immortality as 7th Armoured. Desert nights could be cold, and quite a lot of UK winter weight battle dress was worn on occasion, and in season.

New units were on the way from the UK, however, and these were equipped in the first place, from UK Mobilisation stores. I was kitted out in March 1942 at Hillsea Barracks, Portsmouth, and the scale of equipment was something like this: One tunic with choker neck fastened by two hooks and eyes. Two breast pockets, two side pockets. Brass buttons of the General Service pattern. Two



A 40mm Bofors AA gun and crew defending Miltello in Sicily, July 1943. Only the gun commander wears a shirt and all wear shorts except the seated gunner on the left. Note tin hats worn at rakish angles.

COMBAT COLOURS

No.8: The Bristol F-2B

P.G.Cooksley

The long-lived, two-seat fighter from Bristol was originally seen in the familiar colours of the 1914-18 period, but so long did it serve, that it lasted into the era of the bright silver finishes with mid-grey doped cowlings and forward panels. This is true of the machines that flew with air forces of other countries also, New Zealand being a case in point, with the first pair of Bristols, delivered in 1919, still retaining their PC10 finish still flying alongside the later aluminium doped additions, of which the last to be delivered, in 1927, had metal wheel discs. It seems likely that protection from the destructive effects of the tropical sun was achieved by a coat of PC12 which bestowed a reddish tone to the final shade.

Whatever their finish, one feature was common to all, this being the lettering under the lip of the rear seat. On wartime machines this was painted in white against the dark finish and read 'Do not fly with less than 160lb in gunners compartment'. A slight alteration resulted in many machines in silver finish, bearing: 'This machine must not be flown without passenger or equivalent weight in gunners cockpit'. The first of these appeared as two lines, the second as four. Block capitals were used throughout, usually showing signs of the use of a stencil.

Needless to say, the Bristol F-2B 'Brisfit' is one of the most immortal of all World War 2 machines. Frank Barnwell produced this design, reverting to biplane configuration, in Autumn 1916, after the Bristol Monoplane. Rugged construction and good visibility were keynotes of this latter day 'scout' machine. The original F-2A, with Rolls-Royce Eagle engine, had the radiators on the fuselage side. This obscured the pilot's view in some directions, so they were switched to the nose. Fifty F-2As were built, after which modifications were incorporated, setting the cockpit higher, adding radiator shutters, and increasing fuel capacity. This version of summer 1917, was the definitive F-2B. Some 3,100 were built by the end of the war, many to serve the RAF for over a decade more. The Rolls-Royce Falcon I (190hp) powered the first 150 machines, then the Falcon II (220hp) and III (275hp) were developed and fitted. Some machines were fitted with other engines, such as the Arab and Puma, to overcome an engine shortage in 1918, but these were not entirely successful and relatively few 'Brisfits' were actually built with these alternative engines. Arab-engined machines were the most numerous, over 700, but due to bad vibration not many of these aircraft were actually issued to squadrons.

Because of the huge production orders there were many F-2B manufacturers under the 'parentage' of Bristol. These included Armstrong-Whitworth, Austin



Standard finish machine, A-7106 with RR Falcon engine. Three-line lettering under gunner's ring may just be made out. Four-line legend had been introduced by time of J-prefix serials (Author's collection).

Motor Co, Gloucester Aircraft Co, Harris & Sheldon, Marshalls, National Aircraft Factory No 3, Angus Sanderson, and Standard Motor Co, as well as British & Colonial (Bristol).

The Australian Flying Corps had F-2Bs in Palestine in 1918 and after the war small numbers of these machines were supplied also to New Zealand, Norway, Spain, Belgium, Mexico and the Irish Free State. Belgium later built F-2Bs under licence (40 aircraft), and a number of aircraft were sold for commercial use. In 1917 the American Army Air Corps planned to standardise on the F-2B also, and 2,000 were ordered to be licence-built by the Curtiss company, using a 400hp Liberty engine. Two pattern aircraft were sent from Britain. Only 25 aircraft, designated 0-1, had been built when the contract was abandoned in August 1918 due to the unsuitability of the Liberty engine. A Hispano-Suiza 300hp engine was

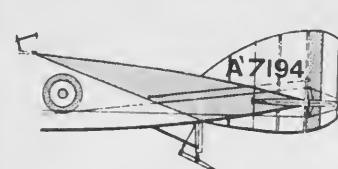


Preserved aircraft in flight showing post-war aluminium finish with grey cowling. Clearly shown is the position and type of upper wing roundel (Author).

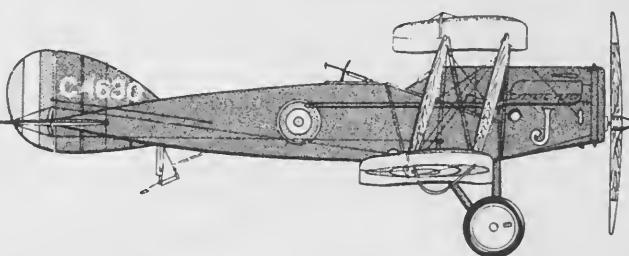
tried instead, as well as a new monocoque fuselage. A Wright H300hp engine was substituted and 40 of this version were built, designated XB-1A. With the war now over no more were built in America, but UK production continued until 1927. The RAF used 'Brisfits' widely until withdrawal in 1932, though the RNZAF used theirs until 1936.



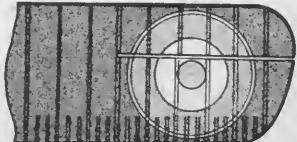
Subject for a model conversion would be H6058, the last of four built by Austin Motors at Longbridge with Siddeley Puma motors. Note natural wood finish interplane struts (Author's collection).



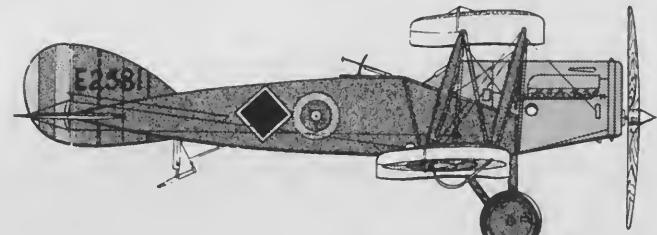
A7194 of No 1 Sqn Australian Flying Corps at Mejdel, Palestine in January 1918. Silver with red side-flashes (not carried over decking), wheels with grey cowling. 'Lift Here' retained.



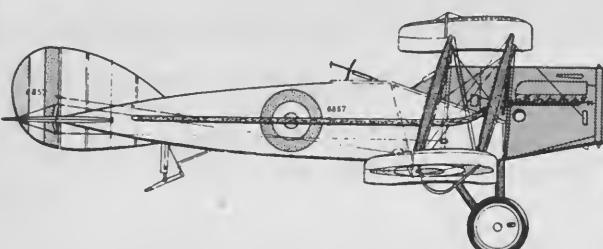
'C4630 in PC10/Clear dope finish. Note clear finish on wheel discs and forward 'J'. Machine known to have been captured intact.



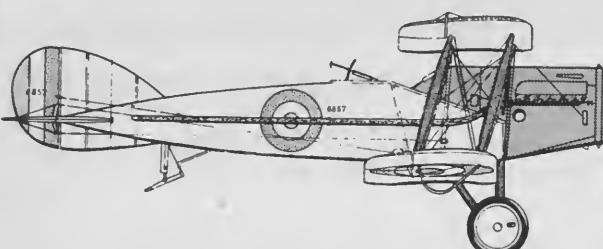
Upper wing roundel of British machine in standard finish. Note white outer rim.



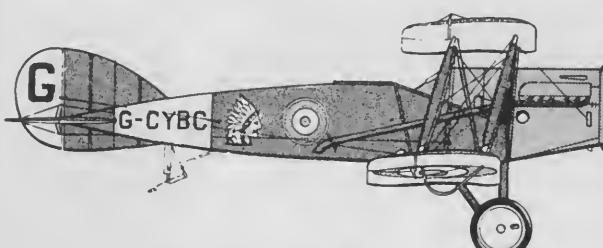
E2581 as it appeared as night fighter with No 39 Squadron. Finish similar to C4636 but with grey nose.



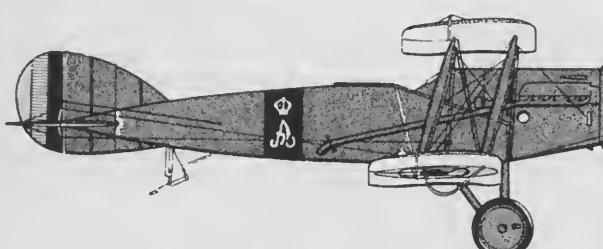
Numeral style across rudder stripes and under gunner's cockpit of silver NZPAF machine with grey cowling in 1927. 6856 similar.



6875 of New Zealand Permanent Air Force at Wigram. All aluminium dope with grey finish cowling. Unrimmed roundels on all silver machines.



G-CYBG, ex-F4336, for Canada with Indian's head insignia. White panel and rudder, clear doped wheels, grey cowling.



Machine presented to King Albert of the Belgians by Handley Page in 1920. Note special insignia. National colours red (outer on roundels, trailing on rudder), yellow and black.



Captured aircraft with four-blade aircrew. Standard finish with black cowl. Note overpainted areas.



Crown and monogram on black fuselage band. Lining of crown is red.



C-140A of the 1866th Facility Checking Squadron at Scott AFB in its original dayglo-red colour scheme. (Official USAF)

Located to the South East of St Louis close to the Mississippi River in the State of Missouri, Scott Air Force Base houses five major headquarters with worldwide responsibilities as well as one of the largest Wings within the United States Air Force.

Scott Air Force Base is one of the oldest, continuous-service Air Force installations and was named Scott Field on July 20, 1917, after Corporal Frank S. Scott, the first enlisted man to be killed in an aircraft crash. The fatal crash, the Army's fourth, occurred on September 28, 1912, at College Park, Md. Corporal Scott was a crew chief on a Wright Pusher biplane, but had gone on this flight as a passenger.

The base became a government aviation station on September 1, 1917, and had a wartime mission of training pilots to serve in Europe. This was initially performed on the Standard Trainer biplane and later on the Curtiss JN-4D Jenny. During the war about 300 pilots were trained at Scott Field as well as several ground

there is the 'Intertheatre system' which uses C-141A Starlifters converted to carry stretchers and walking patients with medical personnel from the 375th. This system will bring patients from the theatres back to CONUS. Thirdly there is the 'Intratheatre system' of which there is one in the Pacific (9 AES/20 AAS with C-9As), one in Europe (2 AES/55 AAS with C-9As) and the 375th AAW in CONUS.

The 375th's 11th Aeromedical Airlift Squadron is equipped with twelve C-9As which fly more hours than any other aircraft within Military Airlift Command. During a normal day one is unlikely to see more than about three C-9As at Scott and of these, two will be undergoing routine maintenance whilst the third will be on alert. On the average, 45 missions are flown weekly by the squadron in the United States and overseas, with each one lasting between 12-14 hours and including eight or nine landings. At regular intervals in the week the 375th will make pick-ups at airfields within the six regions that CONUS is divided into. Operations are controlled from Scott AFB and special measures are taken for patients who are given an 'urgent' rating which means immediate action is required and can involve launching a C-9A in the middle of the night to collect the patient. Those which are not critical but still seriously ill are placed in the 'priority' category which will involve a pick-up by C-9A within 24 hours of the Wing being notified.

The C-9A Nightingale used by the Wing is the first aircraft produced exclusively for the US Air Force's aeromedical evacuation mission. During the mid-1960s the US Air Force launched a competition to select a suitable 'off-the-shelf' jet transport for this mission and in August 1967 it was announced that the McDonnell Douglas DC-9 had been selected as the winner, an order for a number of DC-9-32s being placed and the

The aircraft of Scott Air Base

Paul Mercer looks at some interesting USAF types and colour schemes

units. The airfield was purchased by the War Department in 1919 and the following year it was announced that it was going to become a 'lighter-than-air' station, utilizing airships and balloons. After the construction of a massive airship hangar the Air Service Balloon and Airship School for pilots and observers was opened on July 3, 1922. During these years the base was commanded by Colonel John A. Paegelow who had led the first balloon units into combat during World War I. He was born in Germany in 1870 and after graduating from Heidelberg University served in the German Army before settling in America and enlisting as a private with the US Army in 1897.

Between the wars Scott saw a lot of expansion with the purchase of additional land, the construction of four mile-long concrete runways and the establishment of six schools for training airborne radio operators and mechanics which led to Scott becoming known as the 'Communications University of the Army Air Forces'. By the end of the Second World War most of the radio operators within the Army's airborne units had completed at least one training course at Scott.

With the establishment of the US Air Force as an independent military service Scott Field was designated Scott Air Force Base on January 13, 1948, and the following year the first major command — Air Training — was stationed there.

1973 the 375th Wing-Group structure was revived which is still in existence. From March 15, 1978 the 375th became responsible for over 100 T-39 aircraft stationed across the United States and a month later for the Central Training Facility for CT-39 pilots, meaning that the Wing was assigned about 120 aircraft.

375th Aeromedical Airlift Wing

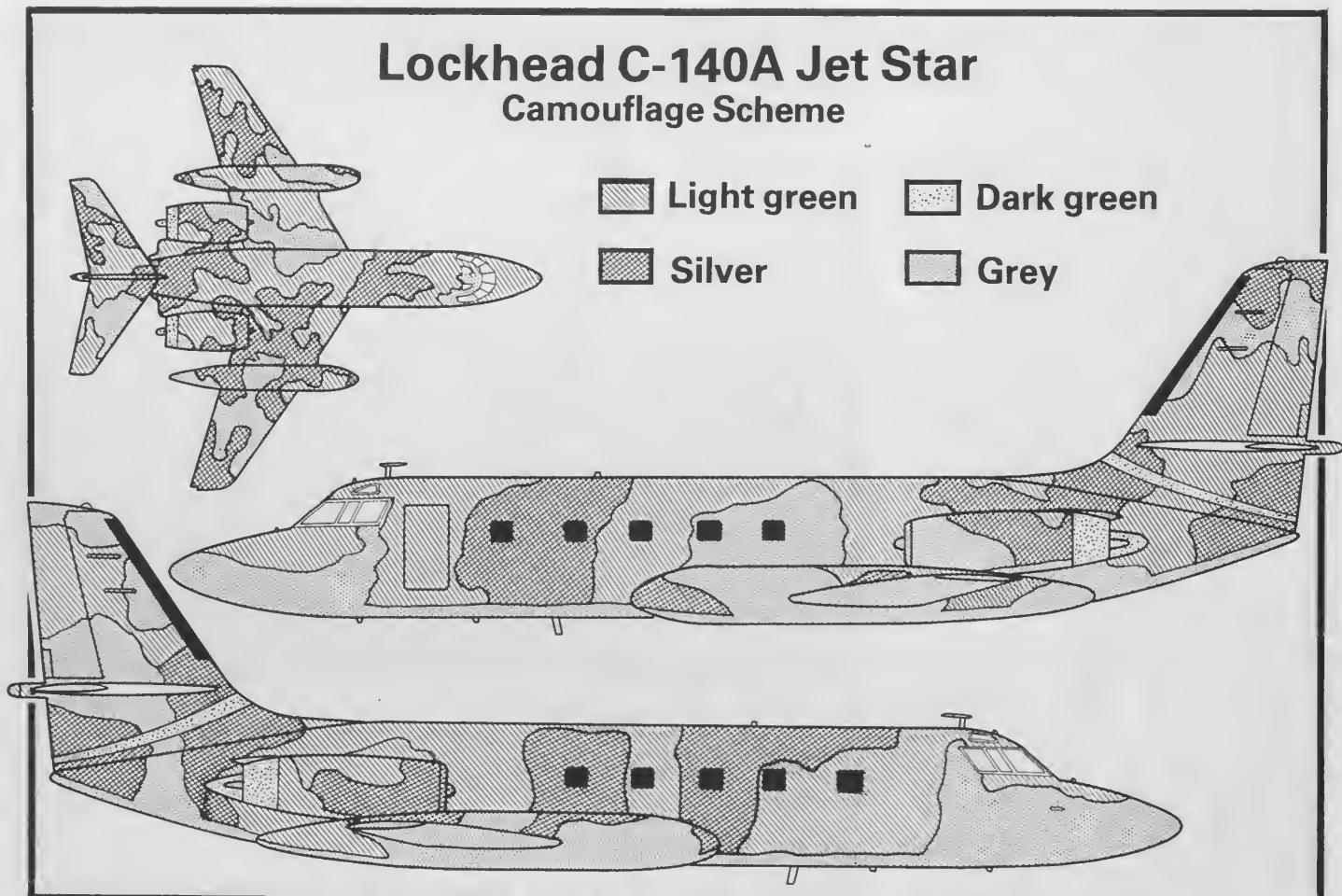
The 375th is a large unit and has three important missions to perform. Initially it is responsible for the management of Scott AFB and as such provides support for nearly seventy units of which about a half are located at Scott itself. Secondly the Wing exercises command and supervision of all T-39 aircraft within the continental United States (CONUS) and finally it is responsible for the management of the worldwide aeromedical evacuation system.

In the aeromedical evacuation role the Wing provides for airlifting American servicemen to medical facilities anywhere in the world in a matter of hours. This global system is made up of three complementary sub-systems. The 'Tactical system' involves the tactical evacuation of patients from the combat zone using a variety of aircraft, often configured for this role. Aircraft used include C-130s, C-123s and C-7s. This aspect is the responsibility of the 1st Aeromedical Evacuation Squadron at Pope AFB, NC which will provide aeromedical evacuation control centres, mobile facilities and supply teams. Next

first one flying from Long Beach in May 1968. The first delivery, the second production aircraft 67-22584, was made on August 8, 1968, to the 375th.

The C-9 is a sleek, twin-engined jet powered by Pratt & Whitney JT8D-9s and externally similar to the DC-9 used by airlines but fitted with a customized interior, as well as some equipment changes. The C-9 is fitted with an auxiliary 110-volt 60-cycle electrical system which enables standard hospital equipment to be operated inside the aircraft. There is also an auxiliary power unit that provides electrical power for uninterrupted cabin air conditioning, quick servicing during enroute stops and self-starting for the engines. The hydraulically-operated ramp at the rear of the aircraft enables the easy loading and unloading of stretcher patients, of which up to forty can be carried internally. The normal crew aboard the Nightingale consists of a pilot, co-pilot, two flight nurses, three medical technicians and one flight mechanic. There is a medical supply work area inside with sink, bottle storage section and work table, an isolated special care area with built-in oxygen, decontamination and separate ventilation systems as well as provision for a therapeutic oxygen supply. These and many more special features go to make the C-9A Nightingale almost a flying hospital, ideally suited for the aeromedical evacuation role that it performs.

The other three flying squadrons within the



375th Aeromedical Airlift Wing and designated Military Airlift Squadrons (MASs) whose role is to provide operational support airlift of people and cargo across the United States. Each of the three squadrons has four numbered detachments, each of which is stationed at a major Air Force installation, most of which house a Command headquarters. The crews of these units routinely provide prompt air transportation for civilian and military distinguished persons ranging from top US and Canadian military leaders to Congressmen, Cabinet-level officials and foreign dignitaries. Aircrew members include pilots permanently assigned to the various T-39 units, and rated staff officers who maintain flying proficiency while assigned primary duties in other career fields.

The Rockwell T-39 Sabreliner was designed for the US Air Force to their UTX specification which called for a 'twin-engine utility jet transport aircraft, the primary mission of which is combat readiness training'. The first T-39A was delivered to the US Air Force on June 4, 1961 and although it carried a 'trainer' designation it was assigned to the major USAF Commands as utility transport. The T-39A is powered by a pair of fuselage-mounted Pratt & Whitney J60-P-3 turbojets and is capable of carrying two crew members and seven passengers with limited baggage at altitudes up to 41,000ft. At the time that the T-39 was nearing its first flight the Tactical Air Command was looking for an economical means of training their F-105D pilots in the operation of its sophisticated radar. It was decided to produce a modified version of the T-39A, which was designated the T-39B, and this version was given priority over the production of the standard T-39A. In the event six aircraft were procured and these featured a larger nose radome as well as extra avionics and a modified interior with consoles to train F-105 pilots. These aircraft were assigned to the 4520th Combat Crew Training Wing's 419th Tactical

Fighter Training Squadron at McDonnell AFB. With the withdrawal of the F-105 from front-line units four of the T-39Bs were assigned to support airlift detachments whilst the remaining two went to the 127th Tactical Fighter Training Squadron (Kansas ANG) for F-105 training.

As the T-39As passed through Depot Periodic Maintenance some were modified to accommodate more passengers. They also featured strengthened landing gear to allow for the greater take-off weight and improved cabin environment. More recently T-39As have been modified to CT-39A configuration which enables them to carry more varied loads. These aircraft were initially assigned to the 58 MAS in Europe and the 475 ABW in the Pacific and more recently to the 375 AAW detachments in the United States, and all aircraft are now referred to as CT-39As.

In 1975 the dozen or so T-39 detachments which were assigned to the Command and Air Force headquarters were placed under the direct operational control of the Military Airlift Command. Initially they were assigned to the 89th Military Airlift Wing at Andrews AFB but

C-9A 88935 from the 375th AAW. The two badges at the rear of the aircraft are those of the 375th AAW and the 932nd AAG whilst the badge at the front of the aircraft is that of Military Airlift Command. (Official USAF)





A Churchill Crocodile flame thrower as employed with success in NW Europe by 79th Armoured Division, demonstrates its capabilities (Vauxhall Motors Ltd).

The Flamethrower Story

The Flame Weapons of World War II

by John Reed

Part 1: The early development and the evolution of British and Canadian vehicle-borne equipment.

On February 26 1915, the French troops holding the sector of the Allied front near the village of Melancourt came face-to-face with a weapon nearly as old as warfare itself, but in every way as terrifying as when it had been used by the Assyrians nearly 3,000 years previously. Flame warfare had entered the 20th Century. By developing a system in which nitrogen gas at a pressure of 23 atmospheres propelled a stream of fuel oil over a friction igniter, a German engineer Leidler had given a new lease of life to an ancient principle, and developed a flamethrower of only limited range, but considerable potential in trench warfare situations.

However, flamethrowers were to attain little more than novelty value during the remaining years of World War I. Within 18 months, the British had two types of their own in service with the Royal Engineers of the Special Brigade. The larger, which fired a ton of oil in a single shot was only used in action twice, and was so cumbersome that its operational debut had to be made from a system of underground galleries specially excavated to bring it to within 100 yards of the enemy positions.

Smaller types were however used more frequently by both sides, but too often proved to be difficult to bring into action when it was necessary to cross a bullet-swept 'no-man's-land' to get within operating range.

Between the Wars

It was hardly surprising therefore that the early inter-war years saw none of the major powers showing much interest in the flamethrower as a permanent feature of their armouries. Yet the situation had changed. First, the tank now provided the means of carrying a short-range projector on to the battlefield, and second, there had been a growth in the Maginot Line type of fixed defence, where the defenders might be particularly vulnerable to incineration, asphyxiation, or the psychological consequences of flame attack.

Curiously, it was the Italians — never in the forefront as armoured vehicle designers — who were the first to see the possibilities of a tank-mounted flamethrower. The 1935 Abyssinian War gave them an opportunity to test a 100 gallon trailer-mounted projector feeding a flame-

gun mounted coaxially with the machine gun of their lightweight CV33 tank. There has been little recorded to provide a clue to the effectiveness of these 'lancia-flammes', but they later reappeared in the Spanish Civil War as part of the 250 tank armoured battalion of the Cuerpo de Tropas Voluntaries, sent to fight alongside the Nationalist forces at such battles as Madrid, San Sebastian and Guadalajara.

The Germans, too, sent flamethrowers to Spain mounted on PzKpfwII tanks, and it was possibly this development that in 1938 prompted the British War Office to issue a specification for the conversion of an infantry tank to a flamethrowing role. The specification was a demanding one, calling for an internally mounted equipment with a range of 300 yards — ten times that of the CV33 lanciaflamme — and 30 minutes endurance, but before the prototype had left the drawing board, World War 2 had broken out, and the designers were confronted with new priorities.

World War 2 — early developments

Responsibility for wartime development of flame weapons was divided between the Petroleum Warfare Department of the Ministry of Fuel and Power, the Research Department of the Ministry of Supply, and the Fuel Research Section of the DSIR, who were specifically interested in fuels. There was little early co-ordination

between these bodies. The PWD favoured pressure and pump operated weapons, whilst their counterparts in the Ministry of Supply were convinced that slow burning cordite was the best propellant for flame fuel.

Predictably, it was the Germans who made the first use of flame in World War 2. Their glider-borne assault engineers used man-portable equipment against the Belgian fortress of Eban Emael, and there was an unverified report of a tank-borne equipment being used against the French near Amiens, but it was the threat of cross-channel invasion that was to provide the British with the impetus for the 'crash' development of their flame barrages for coastal defence.

It was late 1940 before much headway could be made with the proposed vehicle-mounted system. With every available infantry tank desperately needed for the conventional role, supporters of the flamethrower were compelled to look elsewhere for a suitable mounting for the embryo weapons. Their choice fell upon the Universal Carrier, which with its low cost, and excellent cross-country performance was seen as the ideal vehicle for carrying the type of close-support weapon that could be developed more speedily than that called for in the 1938 specification.

Encouraged by the success of trials with a modified 'drain pipe' static projector mounted on the outside of a carrier, the PWD asked the Anglo-Iranian Oil Company to design and build a more advanced equipment. By the spring of 1941, a prototype was ready for demonstration. Fuel tanks had been fitted outside the carrier, feeding a creosote/oil mixture



This Italian CV33 light tank fitted with a late-model flame gun was one of a number used against Allied troops in the Western Desert. Note the solid-tyred trailer (IWM-4585).

McNaughton was a significant convert. He designated one of his Engineer battalions as a trials unit, and his request for more development led to the PWD asking Lagonda Ltd to produce an improved version to be known as Ronson.

Cockatrice and Heavy Pump

Whilst development of the carrier-borne weapons had been in progress, the PWD had also been working urgently to develop a mobile unit for airfield defence. The results were crude marriages between equipment developed for coastal defence and in response to the 1938 specification, and the few types of heavy-duty chassis available. AEC 6x6 Heavy Pump was a coastal defence unit operated by a trailer mounted Napier Lion powered pump, and mounted on an AEC commercial chassis, whilst Cockatrice used a pressure operated flamethrower on an armoured Bedford QL 4x4 chassis. Despite poor cross-country performance, both types were issued to RAF and Fleet Air Arm airfields, but their 300 gallon

ye, one equipped with trailer system derived from the Heavy Pump, and the other a trailer-borne pressure system. Heavy Pump's complex ignition system was by no means satisfactory, and after deciding to abandon further experiments with cordite, the War Office opted for the pressure system, and placed an order for 12 pilot models. Range was reduced from the elusive 1938 target to a more realistic 80 yards, well within the capability of a new 'thickened' fuel, and trials began with a view to tailoring the equipment to the latest Churchill Mk IV infantry tank. In August 1942, however, all development work was curtailed when War Office experts decided that there was no longer a requirement for such a weapon, and that the close support role should in future be the responsibility of units equipped with carrier-borne, and man-portable projectors.

Dieppe

Towards the end of 1941, a flame-thrower specialist, Major J.M. Oke had submitted a proposal to adapt the promising Ronson to Churchill Mk II tanks, and appropriately the PWD secured the co-operation of the Canadian Army in fitting the still experimental equipment to three tanks of the Calgary Regiment, due to take part in the Dieppe raid in August 1942. The very unofficial so-called Churchill Okes — the first Allied flamethrowing tanks — were modified by Lagonda Ltd who mounted a jettisonable fuel tank at the rear of the decking connected by an armoured pipe to a fixed-elevation Ronson projector, fitted to the track guard just forward of the hull machine-gun. Unfortunately, no Oke survived the approach to the beach to test

Barracuda, the Canadian experimental design, led to the development of the flame gun that worked so successfully in the later Wasp and Crocodile weapons (IWM-MH23173).



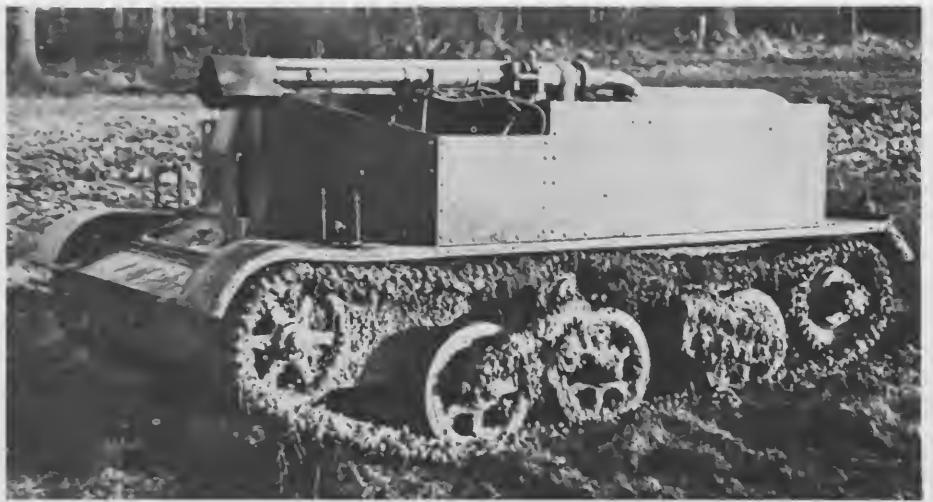
Ronson fitted to a Universal Carrier. It was the promise shown by this type that prompted the further experiments that led to the successful Wasp series (IWM-MH7591).

under carbon dioxide pressure to a long-barrelled flame-gun mounted over the top edge of the carrier's front armour. Its crude 'hot plate' ignition system, and unimpressive 25 yards range won few admirers, yet the carrier remained sufficiently uncluttered to be able to operate in its normal role, and one who was convinced of its possibilities was General A.G.L. McNaughton of the 1st Canadian Corps. flamethrowers, capable of either vertical or horizontal projection, were never used in action.

Valentine comparative trials

By March 1942, both the PWD and the MOS were at last in a position to offer their two rival pump, pressure, and ignition systems for evaluation in tank-mounted form. Two Valentine tanks were emplo-





Wasp Mark I showing the too-complicated flame gun fixed above the frontal armour (IWM-MH7568).

inevitable snags with the first production models had been resolved, orders were placed for a further 1000 kits and the tank which became operational in mid-1944 went on to serve with distinction in the units of 31st Armoured Brigade in north-west Europe, and later with 51st Royal Tank Regiment on the Italian front.

Badger

Late in 1944, the Canadians produced a limited number of flamethrowing tanks based on their obsolescent Ram chassis for use in situations where the lightly armoured Universal Carrier would have been too much at risk. Not unnaturally their choice fell upon the Wasp Mk II equipment which they mounted inboard on the de-turreted tank. The turret ring was covered with a light steel plate on which was mounted a small cupola, and a Browning machine-gun. The excellent cross-country performance of the trailerless tank chassis, made Badger possibly the most versatile of the Anglo-Canadian weapons, and in post-war years three HVSS Shermans were similarly converted for experimental purposes.

Sherman, Crocodile and Satan

The United States Marine Corps had expressed great interest in the Canadian experiments, and took delivery of a small batch of early Ronson equipment for fitting to M3A1 light tanks in the Pacific Theatre. The flame projector — known in US service as Satan — was fitted to the tank's mantlet where it replaced the main armament.

In Europe where the US Army had no high capacity flamethrowers of their own, a small batch of Shermans were modified to Crocodile standards, retaining their hull armament, and mounting a projector on the right of the gunners hatch. The usual trailer was towed but the fuel was fed to the flame gun through an armoured pipe running along the hull-side. In Europe only four of these conversions found their way into service (with 739th Tank Battalion), but a further batch of 200 was supplied for service in the Pacific and used extensively in the island-hopping campaign there.

Crocodile

The Dieppe raid, which had seen the first abortive attempt to employ Churchill tanks in a flamethrowing role, gave a shot in the arm to the development of specialist armour, and from the lessons learned there, sprang the assortment of types that were later to equip 79th Armoured Division.

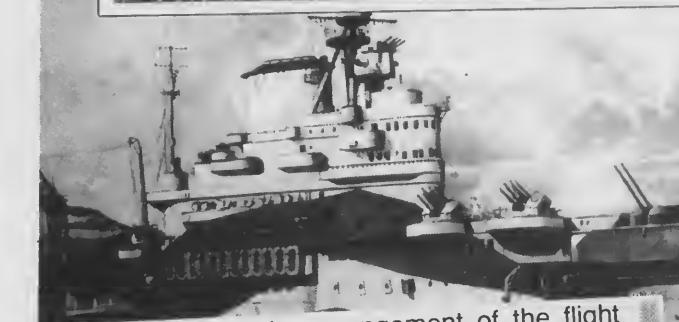
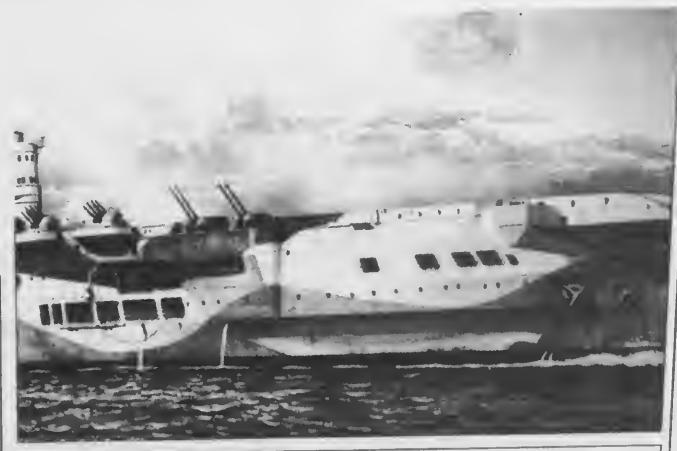
The PWD had never really abandoned development of tank-borne weapons, and when in April 1943, the War Office finally decided that there was a role for such a weapon in the forthcoming assault on Europe, work on Crocodile — a Wasp Mk II modified for fitting to the Churchill tank was already well advanced. Tests with six pilot models proved the effectiveness of the Canadian projector which, with an improved fuel thickened by the addition of aluminium stearate and creosols, could achieve a range of 120 yards. 250 production kits were ordered for REME installation in the new Mk VII version of the tank.

The Canadian commander would not however accept Wasp Mk II as he considered it too inflexible, wishing to operate his carriers in a conventional battalion role as well as for flamethrowing tasks. The outcome of these objections was the Mark IIC, a version produced at first for the Canadian forces alone. An 80 gallon fuel tank was mounted externally at the rear of the carrier in place of the two internal



A Canadian Wasp Mark II 'flaming' during the Normandy Campaign. This was obviously some form of demonstration (IWM-MH23174).

To be continued.



scheme and the arrangement of the flight deck. Heller have provided two schemes — one in camouflage and the other seems to represent the decoration worn by *Illustrious* when the famous Taranto Raid was launched in 1940. The camouflage scheme is somewhat different to that seen in standard references but probably indicates the 1942-43 scheme. The modeller will be well advised to research both these features. The aircraft will also need a deft hand to represent the true colour schemes — the examples shown on the instruction sheet should be ignored. Heller have, however, been very kind and have produced decals for the upper wings and fuselage! Again like the KGV kit, there is tremendous scope for modification and alteration — the *Illustrious* Class consisted of six units — none of which was sunk! Sample courtesy Humbrol. P.B.



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PHANTOM IN THE RAAF

Politics and defence make strange bedfellows — mixing about as well as oil and water. This friction had been part of the political scene in most other countries for decades before Australia ever experienced it in the early sixties. The problem appeared in 1963, after the government of the day had committed itself to buying the 'ultimate' warplane — the F-111, an aircraft then still only on paper. The RAAF was to acquire 24 aircraft at a cost of \$310 million. With larger wing spans, heavier undercarriage and other extensive modifications the aircraft were not delivered until 1973, after they had been some nine years in storage while the makers attempted to meet the RAAF standards.

From 1962 it became apparent that the ageing Canberra bombers were out-paced (today there is still no replacement available and the Canberras will be seen in Australian skies for many years to come). Experience in South Vietnam had shown that an all-weather, supersonic fighter/bomber was needed. By 1970 the Australian Government was still awaiting delivery of the F-111 while the country's defence chiefs were concerned that Australia's defence capability was dropping far behind that of other powers in the region. The United States Government eventually offered to lease to Australia 24 F-4E Phantom IIs. This was accepted and the RAAF found itself with a new aircraft. As the aircraft were to be on lease only, thus not part of the RAAF inventory, no aircraft number was allotted. However, for accounting and stores purposes the type was designated A-69.

The McDonnell-Douglas F-4 Phantom II was a futuristic venture of the fifties, designed to meet anticipated needs. Originally planned as an attack aircraft, it was changed into a gunless all-weather interceptor. In this form it entered service as the F-4A, followed by the F-4B (used by the US Navy and Marine Corps). By this time numerous records had been established. The carrier version remained in production for seventeen years. In 1961 the F-4B underwent trials for the USAF and after out-performing all types was ordered as the modified F-4C; the RF-4C followed in 1965. The RN adopted the F-4K version and the RAF adopted the F-4M. It was RN and RAF modifications that lead to the development of the F-4E, with slatted wing, internal gun and increased power. By 1975 total deliveries were approaching 4,000.

The F-4E has a wing span of some 11.7m (38ft 5in), is 19.2m (62ft 11in) long and stands some 4.96m (16ft 3in) high. It has an all up weight of 27,502kg (60,630lb). Powered by two J-79GE-17



The extensive detailing added to the 'front office' shows in this photograph. Additions included all harnesses for the seats, armament box, ICS leads, first aid kits, firing handles and launch rails. Care was taken to add a HUD to the coaming which was a waste of time as it is not visible unless the viewer is very close to the cockpit.

Gary Byk takes a look at this all-weather gunless interceptor aircraft

engines, each of which produces 19,900lbs thrust, it has a maximum speed of Mach 2.6 and a service ceiling of over 19,600m (60,000ft). Armament consists of one 20mm M-61A1 Vulcan cannon, four AIM-7 Sparrow missiles and either two or four AIM-9 Sidewinder missiles. Some 7,257kg (16,000 lb) of underwing stores can be carried on four underwing pylons, including drop tanks and bombs. The F-4E has a crew of two: a pilot and a weapons/electronics officer.

Expertise had been gained on Phantoms by RAAF fighter pilots serving with squadrons of the United States 7th Air Force in South Vietnam. These pilots attended a six month familiarization course in the US before flying F-4Cs and F-4Ds (both earlier models than the F-4E) in combat missions over South Vietnam.

Whilst in service with the RAAF the F-4E Phantoms retained their USAF serials and camouflage. They were allotted a call sign (the last two digits of the serial numbers) which was displayed on the tail fin. When the Phantoms were deployed in operational squadrons (No 1 and No 6 squadrons) it was to the everlasting chagrin of the 'Miracle Drivers' (service jargon for fighter pilots) that the bomber pilots pushed an aircraft about the sky that had a top speed some two hundred miles an hour faster than the RAAF's premier fighter. It would be interesting to hear any comments now that the F-111 is in service! In the four years that the Phantom was operated, only one machine was lost, when it crashed into

the sea off the Evans Head Gunnery Range during a night sortie, killing both crew members.

Building the 1:32 scale Revell Kit

This kit was built for display, hence the large scale, however other kits are also mentioned in this article because many modellers have space restrictions which may prevent them from choosing such a large scale.

The kit is presented in what appears to be a clean and well moulded style. This is very deceptive, for although cleanly moulded the kit that was built was anything but well designed. It became evident during construction that only marginal thought had been given to some areas of fit and moulding.

To start with the 'front office' presents you with seats, panels and little else. The seats are split with the bottom half moulded along with consoles as an integral part of the cockpit floor. The seat backs are hollow, devoid of pyrotechnics and launch rails. Rear station and forward panels are included along with control columns.

Attention was first turned to the seats. Because of the peculiar way in which these are moulded it is difficult to add harnesses, back-packs, parachutes, etc. Patience and care are needed. A firing mechanism was built, then added to the seats, along with launch rails, headrests and firing handles. A drogue chute line container was made from scrap plastic and fixed to the left side of each seat. The firing handles were made from fuse wire and painted prior to fixing in place with

epoxy glue. The firing handles on these seats are off-set at about 30 degrees which can be achieved with visual judgement and patience. Padding and back-packs were made out of masking tape then cemented in place with PVC glue. The headrests were made from balsa wood, carefully sanded to shape. A small amount of plastic filler was rubbed into the balsa wood to help remove grain before the pieces were cemented with epoxy glue.

The back-packs, padding and head rests were painted with Humbrol Mid-Stone. The seat frames were painted in USAF Interior Grey. Inertia reels were fitted for the seat harnesses, along with the parachute harnesses. Over this standard six point harness, leg restraints and inter-communication-station (ICS) leads were added to each seat. The parachute harnesses were painted Light Grey as were the shoulder straps of the six point harnesses, while the lower belts were painted with Airfix Light Green. An ejection safety disc was made from scrap plastic for

tedious. The cockpit interior was fixed to the right hand half, which was not easy, as modification to enable the floor slats to fit into the locating tab on the fuselage was required. Polystyrene glue was used to cement the fuselage halves together and due care had to be taken to ensure that it did not come in contact with the canopy hinges (parts 26 and 27). The fuselage was clamped then set aside for three days to dry.

All joints were filled and cleaned up in the normal manner. It was found that there were many small holes, including a large gap of some 2mm between the coaming and the front instrument panels. The shroud was extended using scrap plastic and filler.

The mainplane was then assembled. All holes were opened up as required by the instructions. Though the fit was better than that of the fuselage halves it still remained clumsy, due to the incorporation of the moving wing-tips. It was immediately decided to fix these permanently in the down position. A small amount of work was required to



The rear end view shows the added serial numbers on the fin, and yes, they were that small on the Australian machines. The turbine line and kangaroo are seen to good advantage. The national insignia is from the Roodecal range and is in fact two pieces, the blue/white roundel and a separate red kangaroo.

each seat and then installed in the correct location for a fully armed system. Masking tape was applied to the rear cockpit bulkhead to simulate fire-proofing material. At this point the instrument panels were fitted and then the interior was painted USAF Interior Grey.

On a trial run fitting the cockpit to the fuselage halves, it became obvious that a large gap would be visible between the front seat and the rear instrument panel. It was decided to build a coaming from scrap plastic for the rear panel. An old plastic spindle from a one-time can of adhesive bandage was cut in half to form the bottom of the coaming. A duplicate panel was cut to shape and then the two pieces were joined to the rear panel. The coaming was then built up from scrap plastic and filler, then painted matt black.

The fuselage halves were then painted as described in the kit instructions. The arrestor hook (parts 24 and 25) was then put together and painted to simulate natural metal. Joining the fuselage halves together was

clean up both trailing and leading edges. A word of caution: be very careful with the leading edge stakes that hold the slats in place as they break easily. A jig was built from balsa wood in an attempt to instill the correct dihedral into the wing-tips. This was only partially successful, probably because I did not spend enough time on this problem. The join between the wing and folding tip was not filled. When the wings were joined together extensive reinforcing was required. Attention was then turned to the tail planes. These went together very well and required only a quick clean up on the trailing edges.

The cannon port in the nose cone was drilled out. Lead shot was used to weight the nose cone (the radar dish was discarded) before being joined to the fuselage. Once again a small amount of filling was required.

Work continued, this time on the underwing stores which in this kit comprised of three drop tanks, four Sparrow missiles, four Sidewinder missiles and six bombs. The instructions

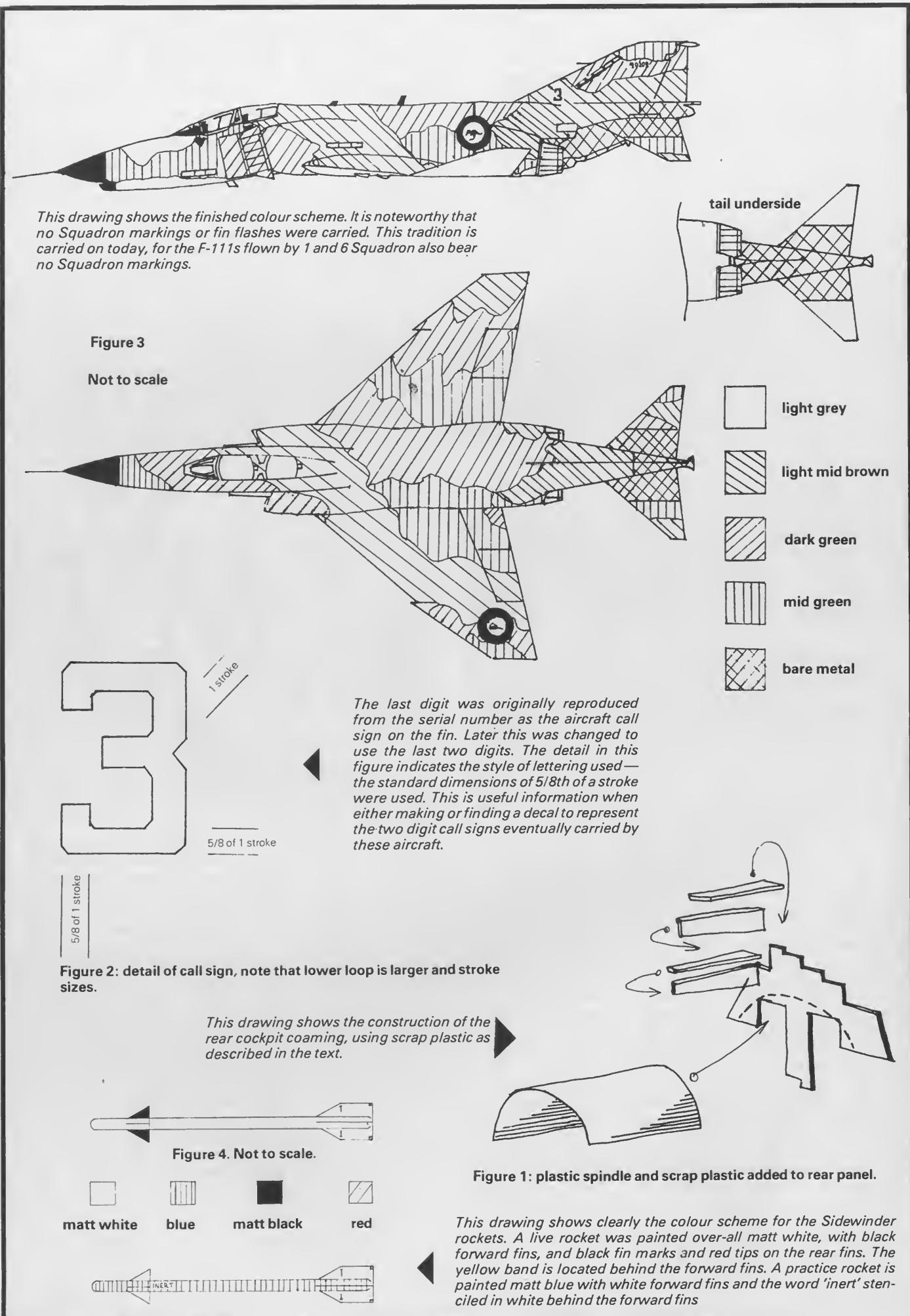


This photo shows the Sidewinder and Sparrow missiles. Note fin marks on the Sidewinders and that the nose air intakes have been hollowed out. Note also the plethora of small decals on the leading edge and about the cockpit — one of the reasons why finishing this kit is tedious.

state that the bombs were not carried on interceptor missions. As the RAAF F-4Es were used wholly within the territorial boundaries of Australia I decided to have my model carrying rockets and drop tanks only. I chose to arm the aircraft with live missiles, rather than practice rounds, so the kit missiles were assembled, with the exhaust ports drilled out and were then painted overall matt white. The Sparrows had a black band added behind the forward fins. The forward fins on the Sidewinders were painted matt black, a yellow band added behind them and the rear fins were given leading edge marks in black and fin tip marks in red. Practice missiles are painted matt blue, with white fins, and have the word 'inert' stencilled in white behind the forward fins.

The mainplane was then joined to the fuselage which very nearly resulted in disaster. When fitted, apart from the now familiar gaps, it was found that the lower fuselage section was too short by some 5mm. If that was not enough the

lower fuselage also fell some 3mm below the lowest level of the empennage. A balsa wood spar was fitted to at least bring the level together. This was reinforced with two small brads. A mould was built and filled with liquid plastic to fill the gap. While this was drying the lower pitot tube was removed from the fin. The air ducts were then added to the fuselage after their interior was painted matt white. Once again the fit was poor, resulting in more filling. Both drop tanks and launch rails went together without trouble. All ignition wires, fuel lines and clutches were made from fuse wire. The launch rails were added before painting the model. At this point the undercarriage was put together without difficulty. Nose cone canopy windshields, canopies and exhausts were masked before painting the undersides USAF Matt Light Grey. Once this was dry the upper surfaces were given their camouflage colours as per the kit instructions. The undercarriage was painted matt white, silver only appearing on exposed oleos, with Floquil Grimy Black being used on the



tyres. Exhaust stains, fuel and grease dribbles, etc, were added after all decals were in place.

By far the most tedious process involved in building this model was that of applying the decals. For the USAF version there are 78 decals alone but to finish the model in Australian markings some 92 decals will be required! The USAF serials were displayed on the tail fin. These were made using figures from the Model Decals No 36 Sheet. The roundels were carried in the four standard USAF positions (upper left and lower right wings: both fuselage sides). No fin flashes were carried. The only other additions were a turbine line and the aircraft call sign.

The majority of the kit decals were small, necessitating careful handling. Some decals did not take well to the surfaces they were intended for, so a small drop of PVA glue was added to the water. This seemed to give the decals the ability to bond well. The film the kit decals are printed on was very shiny so a coat of matt varnish was applied (if you have any of the Micro Scale products available it would be better to use them, however, in Australia they are very hard to come by) which meant that a coat of gloss varnish had to be applied to the canopy (like all RAAF air superiority aircraft, the F-4E did not have a non-reflecting canopy).

As a final touch the canopy sealer can be simulated by applying matt white with an 000 brush around the canopy frames. This often occurs in real life as a clean or messy sealing job depends on whether or not the aircraft handler took the time to mask the canopy or wipe off any excess. Grounding tabs were applied to most ground points. These tapes were made from 3M Micropore Surgical Tape painted with day-glo orange. The canopy supports were made from stretched sprue and Plastruct tubing so as to disguise the fact that the canopies had been broken off by a zealous admirer who had dropped his apple on the model!

As a result I decided that I must build a container in which to display the model, while at the same time giving



This general view of the model shows the bulky look of the kit to advantage. Scuff marks and stains have been added to the walkways and access panels. The abundance of decals is obvious. Panels are indicated by very fine raised lines, which from a distance seem to almost vanish after several coats of paint.

it some protection. I used a piece of three-ply 24in by 14in to which, using white glue, I fitted a 1/4in square strip of balsa wood 3/4in from the edge. A mirror was cut to the internal size and stuck to the base. The cover was made from plexiglass and measured 24in by 14in for the sides (two) and 14in by 14in for the two ends. ABS glue was used to join the pieces. The canopy is held in place by small screws which are removable. I did not fix the model to the mirror, however, I imagine that epoxy glue could be used for this.

Other Phantom kits

The success of the Phantom is mirrored in the number of kits produced, eg 1:144, 1:72, 1:40, 1:32. The 1:72 scale kits seem to offer the most variety and it is for this scale that most specialist decal makers produce markings.

The Airfix 1:72 scale kit is one of the most widely available with the Hasegawa kit running in at second place. The Airfix kit will produce a very good model with a small amount of work. Bryan Philpott, writing in the *Airfix Guide 16: Modelling Jet Fighters*, makes some comments regarding modifications required to the coaming, cockpit floor, canopy side windows, inboard weapon pylons and fuselage. This small book is well worth reading before tackling this kit. Launch rails for the four Sidewinder missiles

will need to be added. The missiles and nose intake will need to come from the scrap box, while the cannon port will need to be squared. Paint the model as described for the Revell kit.

The Revell 1:48 scale kit was supposedly introduced to provide the definitive F-4K/M model. In fact extensive modification is required to produce either of these machines. The kit will build a very good F-4E with some additional work, including the cockpit, wheel wells and underwing stores. If this model is treated as its big sister the result will be very pleasing.

Notes on Decals and Painting:

Use all decals except the following: Numbers 7, 8, 9, 10, 11, 43 and 44. Use either the three or four from decal 44 to model either aircraft three or four from No 1 Squadron. No squadron markings or fin flashes were carried on these aircraft.

The only additions are that of a turbine line (use Scale Master 'Stripes' SM-X Red), national insignia in the four standard USAF positions (I used Rod-decal products for this but there should be little difficulty in finding ESCI or Model Decal products) and the serial numbers (Model Decal figures). Originally aircraft that bore a single digit serial (eg 3, 4, 5, etc) carried a single digit on the fin, however, in later service this was changed to a two digit serial (eg 03, 04, 05, etc).

The model should be painted in USAF colours, Matt Dark Green, Matt Green and Matt Mid Brown, not the lighter Australian colours, so refrain from adding white and red to the paint. Matt black was used for the nose cone, gun port, tyres (if modelling aged tyres use a few drops of white and Humbrol Panzer Grey), rocket fins, control columns and rubber mats and lastly, coamings. Floquil Grimy Black was used for the exhaust stains. Matt White was used for all undercarriage parts and for the live missiles. Some small amount of weathering was applied to the leading edges and jet intakes.



Photographs by
Gary Byk



His Majesty's Armoured Car Cleopatra of No 4 ACC RAF. A compass is mounted at the rear of the turret which, patented by Cdr Godsaves, was used in the survey of the desert areas upon which the maps of today are based (Godsaves Collection).

British Armoured Cars at War, The First Fifty Years

Charles Messenger
Part 4 — Guarding the Empire (1919-1939)

The end of the Great War in November 1918 found British armoured cars operating on many fronts. In France, Palestine and Mesopotamia they had been at the forefront of the final advances. In North Persia, under Norperforce, they were keeping an uneasy peace among the tribesmen, while in the Western Desert of Egypt they were solely instrumental in preventing a recurrence of the Senussi unrest of 1915-16. Of all the types of car which had been used during the war, the Rolls-Royce armoured had excelled in terms of mobility and reliability, although the unarmoured Ford was unrivalled in desert conditions.

There was, however, another part of the world in which the armoured cars had been operating, which has received no mention up until now. This was India. At the outbreak of war in 1914 there was a noticeable increase in unrest among the tribes on the North-West Frontier. In addition there was the continuing fear of a repeat of 1857, which meant that internal security would continue to be an Indian

Army task. With the deployment of the Indian Army in France and Mesopotamia, and other theatres, it was decided at the end of 1914 to form armoured car units in the belief that their mobile firepower would make up for the overall reduction of military strength in India itself. At that time the Indian Army possessed little mechanical transport, apart from a few staff cars, and civilian cars had to be commandeered. The armouring of them was done mainly in Indian Railway workshops, and the result was a very motley selection of vehicles. These were organised into three car units, which were later termed Armoured Motor Batteries (AMBs). In all, sixteen AMBs were raised, and these were deployed with the main frontier garrisons, and with certain other garrisons around India for internal security duties. At the same time, headquarters for the armoured cars was set up at Peshawar. In order to assist with internal security, a number of AMBs were also formed from the Auxiliary Forces. These became known as Class 'B' batteries,

as opposed to the fulltime Class 'A' units. Although the personnel were badged MGC (Motors), they were entirely controlled from GHQ in India, and had no connection with MGC (Motor) units elsewhere in the world.

The first operations in which the Indian AMBs found themselves involved in were on the Frontier against the Mohmands in the latter half of 1915. They were used for keeping the roads open, and it was found that the tribesmen were very keen on trying to ambush them. The tactics were therefore evolved, of sending the cars along the same route for several days, and deploying troops to set up counter-ambushes. As a result of these operations it was found, like elsewhere, that only Rolls-Royces would perform with any degree of reliability, but there were only three of these in the country. One of these, nicknamed 'Wedding Bells', because it had been used at a wedding, had a long history of frontier warfare. Originally built as a Silver Ghost touring model in 1911, it belonged to the

Rajah of Ticca, who presented it to the Indian Government on the outbreak of war. Up until 1925 it was stationed on the Frontier, before turning to internal security duties. Its chassis was used during the Second World War as an instructional model. As a result of the problems of the early cars, the Indian Government managed to obtain six 1914 Pattern Rolls-Royce armoured early in 1917 from the Middle East, as well as forty American Jeffery Quad armoured. The latter, although lacking the robustness of the Rolls, became the workhorses of the North West Frontier over the next few years, and were known as 'JQs'. In March 1918 the AMBs were put on to a more formal brigade organisation, with three batteries to an Armoured Motor Brigade, and when the Third Afghan War broke out in May 1919, 1st Armoured Motor Brigade could boast of being the first troops in, and the last out, of Afghanistan.

In the Middle East life remained busy for the armoured cars in the years immediately after the end of the War. 15 Light Armoured Motor Battery (LAMB) spent two and a half years in NW Persia as part of Norperforce, guarding against possible Bolshevik excursions into Persia. Life was quiet until the summer of 1920 when the Bolsheviks made a landing at Enseki. This meant that until winter brought a halt to operations, the cars were heavily involved in supporting the Persian forces. In March 1921 it was decided to evacuate NW Persia, and the cars covered the 500 mile withdrawal back to Bagdad, which was not made easier by heavy flooding en route, brought about by the severe winter. 8 and 14 LAMBS took part in the operations in South Kurdistan in Summer 1919 designed to prevent Sheik Mahmud from setting up an independent state there. Two cars from 8 LAMB had to be abandoned when a British force was ambushed in the Tashyah Pass, and a further two from 14 LAMB were captured with their crews by dissident tribesmen. 6 and 7 LAMBS, the latter re-equipped with Duncar Austins, were also kept busy keeping the peace in Mesopotamia. The Hedjaz Armoured Car Battery, which had been operating with T.E. Lawrence, was broken up in November 1918, and 1 Light Armoured Car Battery (LACB) which had been part of it, came back into existence. Throughout 1919 and the early part of 1920 1, 2, 11 and 12 LACBs were stationed in Palestine, along with a varying number of Light Car Patrols. The balance of the latter, along with 3 LACB remained in Egypt, patrolling the Western Desert.

The other armoured car unit, 17 Bn Tank Corps, had finished up in Cologne, as was described in Part 3, but it hardly had time to pause for breath before it was summoned elsewhere. After the Easter Rising of 1916 Ireland had remained quiet, but the Sinn Fein gained 73 seats at Westminster in the General Election of December 1918 and refused to occupy them, declaring a republic and vowing to remove the British yoke through attacks on the Army and Police. 17 Bn arrived in January 1919 on a revised establishment. Fourteen Austins were now in one company, with two other companies, one with Medium A tanks and the other

with Mark IV tanks. A Company, with the Austins, was deployed in two car sections around the south-west of the country, and their main duties were patrolling and convoy escorts. However, to confuse the issue, there was another armoured car unit in the country at this time. This was an ad hoc company manned by infantry consisting of two Rolls-Royce armoured and 22 Jeffery Quads. It often arose that 17 Bn Austins, and JQs would find themselves operating together, but under totally different commands. However, this situation lasted well into 1920, when a total reorganisation of all British armoured cars took place.

Towards the end of 1919 the Machine Gun Corps (Motors) was suffering, like other branches, from shortage of manpower because of demobilisation. Indeed, the LAMBS in Mesopotamia, which was under Indian Army control, were being forced to accept untrained personnel from other branches, including even native troops. At the same time, as part of the reshaping of the Army for peacetime, it was decided that infantry battalions and cavalry regiments should revert to having their own integral machine guns. Therefore the Machine Gun Corps no longer had a role. Hence it was to be disbanded, and its armoured cars were henceforth to be taken over by the Tank Corps. However, the LAMBS, LACBs and LCPs would remain in existence until the

The new model, known as the 1920 Pattern, differed little from the 1914 version, but had disc instead of wire-spoked wheels, slightly higher turret sides, and louvres in the armoured radiator doors. Both types began to arrive in Ireland towards the end of 1920. At the same time, it was finally decided to bring all the cars under Tank Corps control, and for this purpose 3 Bn Tank Corps was sent to Ireland in January 1921, taking 5 ACC under command. By May 1921 all the Austins and JQs had been withdrawn, and the new organisation was: 5 AC - 13 Rolls, 20 Peerless; A Coy 3 Bn - 14 Rolls, 27 Peerless; B Coy - 6 Rolls, 14 Peerless; C Coy - 1 Rolls, 8 Peerless. The Tank Corps did not have the personnel to entirely man this large organisation, and hence a large number of officers and men were temporarily seconded from other arms. All were trained by 3 Bn in Ireland. It was found that the Peerless was too unwieldy to be of much use in the countryside, and thus was used in the towns, while the Rolls-Royce armoured were kept for more offensive operations against the IRA in the rural areas.

In the Middle East the transfer to the Tank Corps was more gradual, and was achieved mainly by a trickle of Tank Corps personnel posted to cover the gaps caused by the demobilisation of MGC and ASC (MT) soldiers. By early 1922, however, the Tank Corps was firmly in control. Three



Lancia armoured personnel carrier. Note the RAF roundel (Godsaves Collection).

Tank Corps was in a position to take over their duties. Furthermore, the War Office view was that the light tank would take over the armoured car role because of its better cross-country performance. It would, however, be some years before a suitable model was available.

The first step took place in Ireland, where, with the contraction of the Tank Corps, 17 Bn was disbanded and replaced by 5th Armoured Car Company, which took over its crews and equipment in March 1920. The Rolls-Royces and JQs continued for the time being to be run by the infantry. However, by the end of 1920, spares for both the Austins and JQs were becoming virtually unobtainable. This was partially solved by the introduction of the Peerless armoured car, which was essentially an Austin armoured car body on a Peerless 3-ton lorry chassis, and was built by the Austin Motor Company. At the same time Rolls-Royce began building armoured cars again.

armoured car companies were in Iraq (Mesopotamia) and a further two in Egypt and Palestine. To co-ordinate their efforts, two Group Headquarters were set up, No 1 in Iraq and No 2 in Egypt. In Iraq, 1 ACC took over 6 and 15 LAMBS, 2 ACC 8 and 14 LAMBS, and 6 ACC 7 LAMB and 1 Railway AMB. Little is known of the latter unit, apart from the fact that it had four armoured cars, which could well have been the four Leylands, which served in East Africa and had been discarded by 6 LAMB on arrival in Mesopotamia (see Part 2).

In Egypt 3 ACC took over the LACBs and LCPs based in the Western Desert, while 4 ACC took over those in Palestine. The company organisation in Egypt on Palestine was based on four sections. Two had four Rolls-Royces each (by this time the 1914 Rolls were becoming very tired and were being gradually replaced by the 1920 Pattern), and the other two each had three six Ford car patrols. Those companies in Iraq, however, had just four Rolls-Royce sections of



Above: This photo shows a Rolls-Royce 1921 Indian Pattern. Right: Indian Pattern Crossley on NW Frontier. The bonnet has less of a slope than the Rolls (Author's Collection).



four cars each. Both in Palestine and Iraq the authorities were heavily reliant on the armoured cars for keeping the peace, and they operated closely with the aircraft in this respect. Indeed, Colonel Lindsay, commanding No 1 Group, carried out a number of experiments with the RAF. In March 1922 he deployed a force of seventeen vehicles in the desert for three weeks. It was entirely reliant on resupply from the air. One Rolls-Royce was fitted up as a wireless vehicle, and was able to communicate with the RAF ground stations up to ranges of 200 miles.

It was, however, this growing interdependence between aircraft and armoured cars which brought about a radical change in the armoured car organisation in the Middle East. The British Government had become much concerned at the cost of garrisoning and keeping the peace in the restless ex-Turkish territories of Iraq, Palestine, Trans-Jordan and Aden. The military commanders in these areas freely admitted that the two key weapons in their armouries were the aircraft and armoured car. At the same time, the infant RAF was concerned about its continuing future. Trenchard, Chief of the Air Staff, therefore proposed a new scheme, whereby large military garrisons were replaced by a system of what he called 'air control'. Airpower was to be the cornerstone of this concept, with armoured cars and locally raised levies providing the ground back-up. But, he argued, if the RAF was to take responsibility for these areas, it must have total control of all forces there. Thus he proposed that the RAF should run its own armoured cars. The War Office was naturally not very happy about this, but was forced to climb down by the Government, attracted as it was by the economies that could be made through this scheme.

Thus in December 1921, No 1 Armoured Car Company RAF was formed at Helipolis for operations in Iraq. The Army was little inclined to help with their training, and they were solely reliant on two Rolls-Royce armoureds and six old Crossley

tenders, which were retrieved from the scrap heap. In May 1922 a further training depot was set up at RAF Manston, mainly to provide crews for No 2 Armoured Car Company, which was formed for service in Trans-Jordan. By the late summer of 1922, these two companies had been deployed. However, because of War Office intransigence, they had to provide their own armoured cars. These were again Rolls-Royces, with their chassis armoured by No 1 Stores Depot RAF. The armour was of the 1914 type, although like the Army they now had disc wheels. This was known as Type A. The officers of these companies were all air crew, who were seconded to the armoured cars, although understandably for many it was considered an inferior posting. There was, however, a leavening of armoured car veterans, who had fought with the LAMBS, stayed on with the Tank Corps, and elected to transfer to the RAF, because of their love of operating the cars in the Middle East.

Life for the RAF armoured cars was to be hectic for the rest of the decade. The main problem was trying to keep the peace between the tribes, especially as a result of the rivalry between Ibn Saud and the



8 ACC Crossley set on fire during rioting in Peshawar City 1928 (Author's Collection).

Gp HQ was disbanded, and there appeared to be no role left for No 2 Gp HQ with only one company, No 3 in Egypt, remained in the Middle East. However, it was decided to send it to Ireland to take over the co-ordination of armoured cars there, and it arrived in Dublin in August 1922. Just prior to this 3 Bn Tank Corps had been withdrawn, apart from C Company, which was now equipped with sixteen Peerless cars, and 12 ACC had arrived to take over from A and B Cos, being equipped with fifteen Rolls-Royce armoureds. 5 ACC was still in the country with seventeen Rolls-Royces and eight Peerless, and was based in Dublin, while C Coy was in Belfast, and 12 ACC in the Ulster countryside. At this time the Irish Civil War was at its peak between those for and against the concept of the Free State. In Dublin the British Army was a virtual bystander but in the north, life was

beginning of May 1926, borrowing personnel from other arms and Peerless armoured from the Yeomanry. Z Company was similarly formed from RTC personnel from the Depot at Bovington, taking six Rolls-Royce armoureds from here, and a further ten from the Royal Armoured Ordnance Corps Reserve. Both units were disbanded at the end of July.

It was, however, in India that the major part of the British armoured car effort was concentrated in the 1920s. The move of 6 ACC there in 1921 has already been mentioned, but by early 1922 there were no less than six companies, 6-11 ACCs in the country. 1 and 2 ACCs had been disbanded on their return from Iraq in early 1923, but such was the demand for cars that they were both reconstituted a year later, going to India in early 1925. Initially the companies had to make do with what they took over

British Army contemporary. The dome shaped turret had four ball mountings for machine guns, although only two were normally carried, and the crew compartment had been made more roomy by extending it over the platform and at the rear. It was also lined with asbestos to make it cooler for the crew. This model had solid tyres.

Two years later the Crossley made its appearance, having a similar body to the Rolls, but on a Crossley tender chassis. The majority of companies were equipped with the latter since it cost less than the Rolls, although 8 ACC were unfortunate enough to have to endure Austins, the tail end of the second Russian order (see Part 3), which the British Army had rejected, in view of 17 Bn Tank Corps experiences with them. They even had 'verstometers' instead of miles, but, apart from a proneness to weak axles, there was also a chronic shortage of spares for them. By the mid 1920s they too had been exchanged for Crossleys. The duties of the armoured cars remained as during the war. The majority of companies were on the NW Frontier, but rotated every so often with those on the plains, who were responsible for internal security, and indeed often found themselves helping to quell riots.

In 1928 another milestone in the story of the British armoured car was reached. The British Army was slowly waking up to the fact that it must spread mechanization outside the Royal Tank Corps. Many now thought that the horse would become increasingly less effective on the modern battlefield, but money and the will, were lacking for any more than small scale advances in this direction, apart from continued resistance from influential conservative quarters. It was thus decided that the two most junior cavalry regiments which had escaped amalgamation just after the war should convert.

It was a fearful wrench for the 11th Hussars and 12th Lancers to give up their horses, but they gritted their teeth. The 11th Hussars carried out their conversion at Tidworth. They took over the cars of 12 ACC, which was then disbanded, and drew up further from the reserve. Their initial establishment as three 'sabre' squadrons each with eleven cars, with one in squadron Headquarters (SHQ) and two sections of



Guy armoured car in India traversing some awkward terrain (Author's Collection)

more hectic. However, this state of affairs did not last long, and in December the British Army pulled out of the South, 5 ACC handing over some of its Peerless and Rolls-Royce armoureds to the Free State Army, prior to moving up to Belfast. In March 1923 No 2 Gp was disbanded, and 5 ACC was sent to Scarborough, where a squadron of the Royal Naval Armoured Car Division had been stationed in 1915. C Coy returned to 3 Bn Tank Corps, leaving only 5 ACC in N Ireland, where it remained until 1926.

Meanwhile, as part of the reorganisation of the Territorial Army after the war, it was decided to convert eight of the existing yeomanry regiments into armoured cars. These were equipped with the Peerless, sixteen per regiment, and were redesignated 19-26 ACCs Tank Corps, although they were allowed to retain their original titles in brackets. In 1926 12 ACC was brought back from Ulster in order to help cope with the General Strike. 5 ACC also assisted, but in view of the fact that all the remaining ACCs were either in Egypt or India, it became necessary to form temporary armoured car units from Royal Tanks Corps ('Royal' prefix had been granted in 1923). Consequently, Y Armoured Car Company was formed at Catterick at the

from the AMBs — JQs, a few 1914 Pattern Rolls-Royces and some varied 'home built' models. However, when the Government of India made its decision in 1920 that its cars should be manned by the Tank Corps, it put in orders for cars made to its own design. The first to appear was the Armoured Car, Rolls-Royce, 1921 Indian Pattern, which, although built on the same Silver Ghost chassis, had a different body to its

Lanchester armoured car. Note the padlocked stowage locker (Author's Collection).



"AFTER 95 HOURS ON THE "MATCHBOX" PUMA, I WOULDN'T MIND BUILDING ANOTHER."

Phil Hunt took up modelling at the age of nine and hasn't put it down since. In 1980 he won the Aircraft Diorama Class in the IPMS National Championships.

When he's not working as a sales representative for a plastics company in Sevenoaks, just about every moment of his spare time is spent either modelling or researching for models.

He travels to about thirty air shows every year to take close up photographs of aircraft. And he has built up an indexed reference library of magazines so he can quickly find any information or plans he needs. He discovered articles on the Puma in ten magazines.

First $\frac{1}{32}$ scale all British Puma.

Unlike our new British made "MATCHBOX" kit, the real life Westland-Aerospatiale Puma was the first product of Anglo-French co-operation in aeronautics. Built to replace the Whirlwind, it was developed to answer the need of the French Armée de Terre and the Royal Air Force for a helicopter capable of supplying troops in advanced combat zones. The first production Puma flew in 1968. Driven by twin turbines, each one powerful enough to fly the chopper on its own, it proved an immediate success. Now it has even more powerful engines and with its streamlined airframe achieves a maximum airspeed of over 145 knots. The excellence of the original design has ensured a useful future for the Puma for many years yet, not just as a military craft but also in civilian use. It's in regular service on North Sea oil rigs, for instance. It also works as a passenger and freight carrier. There are four versions of the Puma in the kit, including two RAF squadrons,



a French (Corsican) Armée de l'Air carrier and a French Civil Ambulance.

A Puma in tiger's clothing.

Inspired by some photographs in Military Aviation Review, August 1978, Phil chose to decorate his "MATCHBOX" Puma in the markings for a NATO Tiger Meet. This is a gathering of NATO Squadrons with the common link of a tiger motif in their unit badge. The 1978 Meet brought together 13 Squadrons of 9 nationalities. And as usual every aircraft was painted with tiger stripes, which wash off after the event.



Checked against a real Puma.

Phil took a good look round a Puma at Biggin Hill and studied close-up photos taken at 33 Squadron in Odiham (one of the options in the kit). And his cross-referencing system told him that the actual plans were in Vol. 7 No. 7 of Aviation News. If you have any trouble getting hold of reference material, Phil recommends Beaumont Aviation Literature, 656 Holloway Road, London N19.

He said that the very few details in the kit that had not been included were all ones which were well-nigh impossible to mould, or which could be better reproduced by a fastidious modeller. He mentioned that the paint instructions were very precise and that sometimes other manufacturers' kits could be a bit hit and miss on these.

Buckles from 5 amp fuse wire.

Phil did the control panel in semi-matt black then highlighted the instrumentation using the dry brush technique. His detail within the cockpit is meticulous. For instance, although the seat straps are featured in the kit, Phil preferred to make his own. So he cut the moulding off the seats, sanded them down and replaced them with finely cut strips of masking tape sprayed dark grey. The buckles were made of 5 amp

fuse wire. As a finishing touch, on the parts of the seats which get most wear he's reproduced a grimy, well-used look.

Of course, having spent so much time on this detail, he wanted the results to be appreciated. So he separated the top glazing bar from the door using an X-Acto razor saw - these tiny tenon saws allow for very precise work. Then he hinged the door open with fuse wire to allow a good peer inside.

The colouring on the turbo jets is most convincing. He mixed Humbrol Aluminium with varying amounts of grey and black. Then, to create a more authentic in-service look, the burnt effect on the outlets was created with a light spray of Night Black and Rust.

Referring to the Aviation News plans, he then detailed the hydraulic sump and added the eight hydraulic pipes on the main rotor head - yet again using fuse wire. He also reproduced the colour coding on the rotor blade fairings, using SCALE-MASTER coloured decal strips. Finally, the distinctive tiger stripes were airbrushed freehand.



Like bees round a honeypot.

This Puma has already won its class at the Kent branch IPMS in April and the moment it came out of its box everyone swarmed round like bees round a honeypot.

Phil Hunt says he'll probably be starting another "MATCHBOX" Puma soon. "This is one of the best kits they've ever tooled up. And there's so much potential in the thing - particularly for detailing around the engine..."

MATCHBOX
AIRCRAFT KITS

"MATCHBOX" is a registered trademark of Lesney Products & Co Ltd.





Commissioning of RAF Crossley HMAC Enterprise, the naming of which is being undertaken by the lady on the left in a smart 1930's outfit clutching the customary bottle of champagne. Note the arrangement of the wireless aerial, and Aldis Lamp on commander's cupola (Vickers Ltd).

five cars each, with an additional car at Regimental Headquarters (RHQ), making 34 armoured cars in all. The 12th Lancers took over the cars of 3 ACC in Egypt, as well as those of 5 ACC, which had been sent from Scarborough to Shanghai early in 1927 to help protect the International Settlement in the face of the civil wars in China and was returning home to be disbanded. In the event, both 3 and 5 ACC managed to survive to be formed into 6 Bn RTC in 1932. The 12th Lancers were on a similar establishment to the 11th Hussars, except that they operated in three car troops. By this stage, both regiments had a mixture of 1920 and 1924 Pattern Rolls-Royces. The latter was similar in shape to the former, except that the commander now had a cupola.

All the Royal Tank Corps armoured cars were now in India, but the early 1930s began to see their phasing out. The immediate post war premise that the light tank could perform the duties of the armoured car much more effectively was being upheld on the Frontier. The four wheeled, solid tyred car was found to have a limited performance off roads and tracks. Attempts were made to improve cross-country performance by introducing a six wheeled armoured car. This was the Guy, sixteen of which were sent to India in 1928, but although its performance off the roads was fair, it was too heavy for many of the roads and bridges on the Frontier, and was withdrawn from service in 1934. The War Office also ordered a similar vehicle for the UK cavalry armoured car regiment, and these were sent to the 11th Hussars in 1931, along with the Lanchester 6-wheeler. However, they too were withdrawn from service before the outbreak of war in 1939, some being sent to the volunteer forces in Malaya, where they were captured by the Japanese. By 1930, however, a suitable



11th Hussar 1924 Pattern Rolls-Royce, recognisable by the commander's cupola, in Palestine. Note the soldiers tropical uniform (The Eleventh at War).

light tank had been produced by Vickers. Four were sent to India for testing in 1931 and found suitable, apart from some minor modifications. There now began the gradual conversion of the armoured car companies into light tank companies, and in 1932, 2 and 7 ACCs were the first to be subjected to this change, their cars being handed over to the Auxiliary Forces. Gradually the remaining companies were converted. In the late 1930s it was decided to mechanize the Indian Army, and the Royal Tank Corps supervised this, before leaving the country in toto in 1938, its manpower being absorbed in the expansion of what had now become the Royal Tank Regiment (RTR). It would not be for another twenty years that the RTR would renew its connection with armoured cars.

The 11th Hussars relieved the 12th

Lancers in Egypt in 1934, the latter returning to Tidworth. By this stage the Egyptian armoured car regiment had been equipped with five Crossley 6-wheeled armoured cars in addition to its Rolls-Royce armoured cars. These were used as wireless cars and were distributed two to RHQ and one to each SHQ. In 1936 the Regiment was deployed to Palestine to deal with the Arab rebellion there, No 2 Armoured Car Company RAF with their Rolls-Royces were, of course, already in the country. The armoured cars, both Army and RAF, would spend the next three years dealing with the Arab menace. Their main task was to act as convoy escorts, and ambushes were frequent, but the cars proved invaluable in this situation, and the only real threat against them was mines, which the Arabs became very adept at laying. To counter

this, additional armoured plate was fixed on the underside of the cars, extending from the front axle to the driver's seat.

The RAF continued to man armoured cars in Iraq throughout the 1930s. Its organisation, however, had been contracted with the disbandment of No's 3-6 ACCs in 1930. No 1 ACC had been reformed in their place, and a detachment of two Rolls-Royce armoured cars was sent to Aden in early 1928, where they became D Flight of No 8 Squadron. The RAF, like the Army, experimented with the 6-wheeler, but opted solely for the Crossley and a number of models were supplied to them, but they never superseded the Rolls. But, conscious of the need to replace their ageing Rolls-Royces at some stage, the RAF did show interest in an armoured car designed by an expatriate Hungarian, Nicholas Straussler, who had joined the firm of Alvis. Twelve of his Alvis-Strausslers had been ordered by the Dutch for service in the East Indies, and the RAF, having tested it in the Middle East, decided to order twelve as well. Two were sent to No 2 ACC, who did not like them because of their tendency to overturn, so they, and a further two, were sent to Aden. But the outbreak of war, and the difficulty of obtaining parts, many of which originated in Hungary, put paid to any more deliveries.

Back in Britain, 1934 saw the continuation of the mechanization of the cavalry. But no further regiments were given armoured cars, those being earmarked for conversion either being equipped with light



Alvis-Strausslers in Aden watched by the locals with great interest (Alvis Ltd).

tanks or light trucks, which were eventually replaced by light tanks as they became available. As part of the expansion of the Army after the Munich Crisis of 1938, the eight yeomanry armoured car companies were expanded into regiments, getting back their old titles, but only one, the Derby-

shire Yeomanry, stayed as an armoured car unit in the long run, the others all eventually converting to tanks. Thus on the outbreak of war the British armoured car would appear to be on the decline, especially in the Army. Its status, however, would soon change dramatically.



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MODELLING THE BRISTOL FIGHTER an easy one in 1:72 scale

Adding a 1:72 scale Bristol Fighter to your collection is no problem for there is an Airfix kit currently still listed. Though quite an early kit, it is a good one, accurate in shape and detail, even though it lacks the more recent biplane refinement such as linked and slotted interplane struts which make assembly rather easier. With the Airfix 'Brisfit' you have to assemble each strut individually in the old manner which requires a little more care. To keep all the struts and wing in the correct place while the cement dries, a good method is to turn the model upside down (having first ensured all the upper strut ends are in their locating holes), then support the model with paint tins or something similar to hold the wings at the correct angle of stagger while the cement dries overnight.



Adding to the new rudder, with the original discarded portion of fin alongside. Seats have been added from plastic card.

There are several good reference books on the 'Brisfit', aside from the material supplied in Peter Cooksley's article here. *Fighter Aircraft of the 1914-18 War* (Harleyford), *Bristol Aircraft since 1910* (Putnam), and *Profile 24* (also in the bound *Profile Vol I*), between them give excellent coverage. Several different models could be made, all



Check the 14 degree wing stagger with a card template drawn with a protractor. Use small heavy items like paint tins to support the wings at the correct stagger while the cement sets — with the model upside down.

with changes in colour scheme and minor details such as the run of the prominent exhaust pipes, which tended to vary. Then there were several engine variation (well covered in the *Profile*) if you want to play around with Milliput and plastic scrap to vary the nose shape.

Having made some basic World War I versions some years ago, I decided to try another slight variation and make the final production version (actually a rebuild of old airframes), the Bristol Fighter Mk IV which was the final type for the RAF. Actually it belongs to the 1928-32 period and must have been one of the last basic World War I designs in front-line service anywhere. It makes a good contrast to earlier types like the Bristol Scout or DH2.

Essentially the model is made straight from the kit with just simple detail changes. The prime alteration is the removal of the moulded rudder — just saw it off — plus a segment from the top of the fin. Then use the template given here to mark out and cut a new enlarged rudder from 30 thou plastic card. File and sand to aerofoil section and

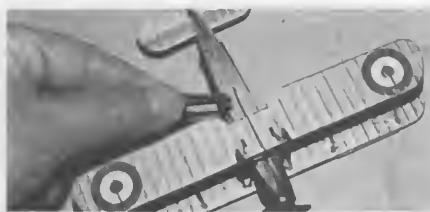


Model before painting shows the added features like leading edge slots, new rudder and wing bumpers.

cement in place. Also add seats and other cockpit detail.

The wheels and undercarriage were slightly beefed up on the Mk IV — pictures seem to show larger tyres. If you can find a spare pair of wheels with thicker tyres, use them. Otherwise do as I did and paint the tyres a little 'thicker' on the wheels supplied.

Leading edge slots were another Mk IV feature; 1.5mm wide lengths of Microstrip, 30mm long, were cemented along the upper wing leading edge lined up between the interplane struts.



Adding the message pick-up hook — aircraft was used for army co-operation work and snatched despatches on a rope slung between the two posts.

Extended exhaust pipes were added. The existing pipes were bent gently at the engine end over a candle flame so that the exhausts ran aft along the mid line of the fuselage. The locating pins were removed. Then 27mm lengths of Microrod of equivalent diameter were glued in place as extensions, though I did not do this until all painting was complete since the pipes pass over the side of the roundel and part of the fuselage serial number.

Lastly add a message pick-up hook (from heat

stretched sprue) under the fuselage from the centre of the wheel axle with the hook cemented to the fuselage underside — it needs to be 28mm long and is done last of all after painting is complete. Finally bumpers from thin Microrod should be curved to shape and cemented below the wings lined up to the outer interplane struts — these are not included in the kit parts.

I finished my model as F4587, illustrated in most reference books. It is silver with black cowl as for the kit colour scheme. Larger fuselage

finished model in standard colour scheme.



Blue on rudder extends over horn balance.

roundels are needed plus new serials from lettering sheets, but the wing roundels come from the kit. Cut the lower roundels in half to fit them neatly round the underwing bumpers.

After painting and marking, use heat-stretched sprue to add rigging. You end up with an interesting final development of a World War I design, but also with a model to go with a collection of inter-war models, and there are not too many of those about!

Chris Ellis

Aviation Index: 2

Compiled by Phil Hunt

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Lockheed Neptunes were amongst the first ASW aircraft to combine active and passive detection systems. Their good payload making them ideal to carry their 2½ tons of sub-hunting equipment and a variety of ASW armament as well (Lockheed).

The Modern Submarine Service

by Andrew Ambrose

Part 4

Possibly one of the most important items used in modern naval wargames, is the 'SDC' or 'Ships Data Card', which is the card used to store all the information on the individual ships abilities, values and damage records, (specimen cards were shown in Figure 3, in the last part of this series). Before proceeding it is therefore, prudent to understand the use and methods of recording which are used on these cards.

The SDC has two sides, known as side A and side B. Side B is used to store the information being collated from various reference works available on the market such as *Janes Fighting Ships* etc. From this information, a ship's 'survivability factor' is obtained by the use of the following formulae: Firstly, the ships standard tonnage is divided by four. Using HMS *Blake* as an example, this would give us $9,500 \text{ tons} \div 4 = 2375$. To this figure an allowance for the ships type of construction is added as shown in Scale 1, which in the case of *Blake* is 300. We then have 2675. In addition, a flotation factor is added, which broadly speaking, is based on the vessel's number of flotation chambers/watertight integrity. For Naval vessels this figure is arrived at by dividing the ships standard tonnage by 38, hence

giving a figure of 250, and a total survivability factor of 2925. This is then entered on the ship's SDC in the respective position on side B, and again on side A in the blank box on the right hand side. This box is used to keep a running total of the state of the ship in general, and as the game progresses, the points total is gradually reduced by receiving hits from shells, missiles etc as detailed later.

One will notice from the SDC's that the remainder of side A is used for logistics and damage control records. These boxes are used to mark off damage to specific of the ship's abilities, and her use of basics such as fuel and general supplies. The scope of this article really prevents an in-depth explanation of these sections, and therefore players new to the game, are advised to ignore these sections altogether for the moment, and only introduce these elements to the game later as more experience is gained, and additional interest is to be created. Further details of the use of these items may appear in later editions of *Airfix Magazine*.

Each vessel in the game is given a specific ability to withstand a certain amount of destructive effort. This is known as the ship's survivability factor as just discussed,

and for the vessel to be totally destroyed, it must be hit by an equivalent CSV or Critical Strike Value of missiles or shells etc. The missiles' or shells' CSV is dictated by the warhead size and type, and not by the delivery vehicle. For example, an Exocet missile has a warhead of 220lbs (100Kg); to arrive at its CSV, the warhead weight is simply multiplied by four, thus giving the Exocet a CSV of 880. Therefore, if HMS *Blake* was hit by one Exocet missile, 880 would be deducted from her survivability factor thus leaving her an SF of 2045. If *Blake* was hit by three Exocets, she would be on her last legs, and if hit by four, she would sink immediately. However, that is only if all four actually hit her!

To determine whether a missile launched has actually hit the target another factor is brought into play. That is the missiles EF or 'efficiency factor'. The EF is determined by the ability of the warhead's delivery vehicle and is not affected by the warhead size. An EF is determined by reference to the efficiency factor of the prototype and divided by ten. Therefore, the Exocet with an efficiency factor of 92%, is allocated an EF for the game of 9. To determine whether a hit has occurred or not, two dice are rolled, and if

the total of both dice is the equal of the missile's EF, a hit has taken place and the CSV of the missile is effected against the target, but if the dice roll gives a figure of above the EF, then a miss has occurred. Anything rolled less than the missile's EF, will result in a hit, but the lower the dice roll, the further away from the ship's centre is the strike point of the missile! With Torpedoes, exactly the same process is followed, but with the additional complication that the firing party must also predict the track and time span of each shot, due to the much slower speeds involved with these weapons.

Missiles fired during a tactical move only allow time for one anti-missile missile to be fired against them. However, if for example, an SSM is fired during an Operational move the defending player will have time to launch two AMMs. Firstly an area defence missile such as Seadart, followed by a Point defence missile such as Seawolf. (NB. Players and umpires should keep a careful record of how many missiles they have used, in order not to expend all their available supplies).

Having covered the destructive abilities of the weapons and their resultant effects on the ships they hit, our next area of interest is 'detection', which is another of the important items in the overall context of Anti-Submarine warfare. The most important Anti-Submarine device in this field is Sonar, which for the purposes of the game, we shall say is comparable to above water radar although technically this is untrue. A Sonar contact, will give the operator a bearing of the target, its approximate distance off, and a rough idea of its depth, in a similar manner to Radar. However, there are two distinctly separate forms of Sonar, these being passive and active devices.

As already stated, the active sonar is of a similar nature to Radar only working below the surface, but passive systems are of a very different nature indeed. Passive sonars consist of several widely differing systems including; (a) Hydrophones, which are in effect underwater microphones which listen for the noises given off by a contact. (b) Electronics, which listen for the opponents 'active' sonar systems. (c) MAD, or Magnetic Anomaly Detectors, which detect even the slightest change in the Ocean's magnetic field thereby giving away the



A French Navy SA-321G Super Frelon operates a dunking sonar search off the Atlantic coast.

presence of a submarine. (d) Infra-Red Linescan, which can detect the minute particles of 'hot' water given off by the submarine's exhausted reactor cooling water particles, as they float to the surface.

The effectiveness of these differing systems, and their corresponding allocation of a value in the wargame, is a rather difficult programme, as for example, passive sensors in use in the early seventies, were able to detect deep sound patterns in the water, which had been trapped in time almost, between water layers of differing temperatures. These sound patterns were later found to be sources of vibration which had initially been caused by depth charges and explosions from as long ago as World War Two! If nothing else, this proves most conclusively, that modern submarine detection systems are indeed highly sophisticated. Unfortunately however, the powers in authority seemed most alarmed when asked for accurate details of ranges and abilities of present day devices, and frankly refused to give any further information than that which is on public record, so for the purposes of our games, we have had to make a lot of estimates in regards of the exact abilities of ASW equipment.

With the use of very low frequency sonars nowadays, the ranges of active sonar detection equipment has been vastly increased, but due to the very nature of the elements themselves, there are a lot of inherent drawbacks to virtually all the systems in present operation. As such, for the game we have allocated each specific item of equipment with an efficiency factor which is used in much the same manner as the EF of a missile. Let me explain the reason for this method adoption: A ship mounted sonar will, (because of the greater amount and sophistication of equipment which can be carried) possess a far greater range capability than the equivalent aircraft or helicopter carried unit. However, because the ship must propel itself through the water and be able to operate a search, it creates its own sound pattern, which will diffuse and divert sonar signals and consequently lower the units effective range. This type of argument seems to progress throughout the entire spectrum of underwater detection equipment, and consequently adds yet another problem to this already rather 'grey' area.

The method of using sonars and radars during a game, will be dictated largely by conditions of play, but as a general guide, players will operate their radars at all times, along with ship mounted sonars which require no external support. However, for aircraft to operate sonar search, for ships to operate VDS (Variable Depth Sonar, which is towed on a long cable behind a ship in order to remove the detecting heads away from the ship's sound and turbulence generation etc), and any non standard equipment such as either dunking or air-dropped sonobuoys etc, a player will need to inform the umpire of his intentions before proceeding to operate the search. This is demonstrated in our explanatory game.

Aircraft Operations

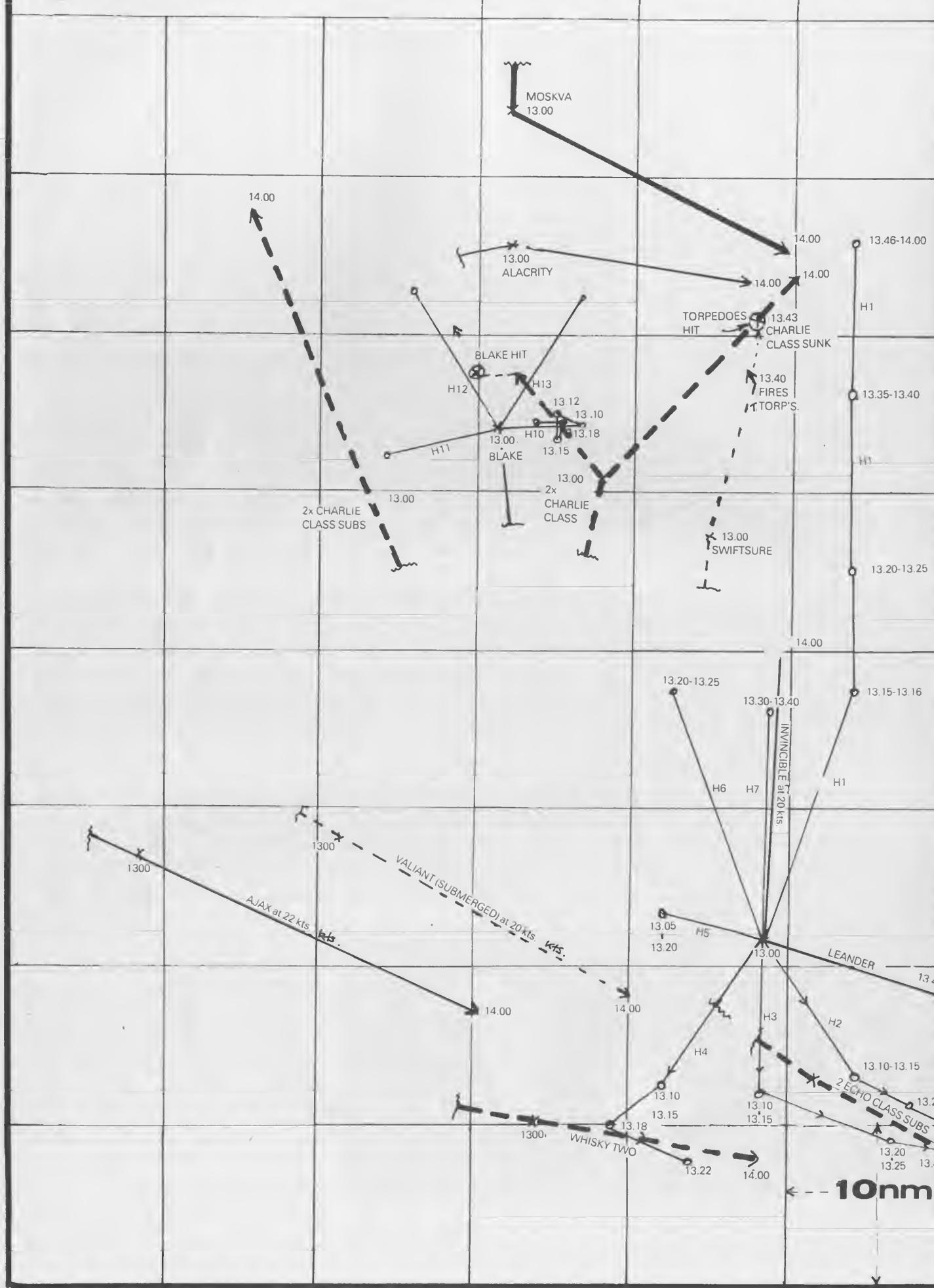
Although aircraft can take part in tactical moves, their speed makes it impossible to record their movements in this phase of play so the plotting of aircraft moves is only



The United States Navy S-3A Viking, is one of the most advanced Carrier Borne ASW Hunter Killers available today. It has on board the most sophisticated array of avionics ever developed for a tactical aircraft, including a large on-board digital computer. The probe which can be seen extended from the tail in this view, carries a set of various types of sensor including the MAD, and Linescan pickups (Lockheed Aircraft).

OPERATIONS CHART

fig. 1



carried out on the Operations Map. It is said therefore, that an aircraft in a tactical move can cover the whole area of tactical play in each six minute tactical turn. Operational movements of aircraft proceed in the normal way, their speed in miles per hour being recorded directly on to the Ops map. The only alternative form of operation called for in which aircraft plotting and operations would need to diverge from the above system, would be for example, when a helicopter was operating a sonabouy dunking search of a particular area, and as such would not move at all but would in fact hover over a certain given point, and would lower a sonabouy into the water, and operate a search for submarines. In the tactical phases of play this manoeuvre is carried out using a helicopter model piece, and positioning the model in the tactical play area at the precise point at which the player wishes to operate his sub-surface search. A dunking sonabouy search of this nature can take anything up to six minutes, or as little as one minute dependant on the operating players wishes, but a minimum period of one minute must elapse between successive searches — longer obviously if a helicopter has to travel any distance between successive searches. Therefore, in any six minute game turn, a player may make a maximum of three sonar searches.

In the operations stage of play this manoeuvre is carried out by the player marking on the operations chart at the beginning of each turn, a plotted course for the searching helicopter, together with a small circle at each position he wishes the helicopter to operate a scan with its sonar. Alongside the circle he must mark the time and duration of each particular search, so that the umpire can check at a glance, the likelihood of any possible contacts he may make.

An aircraft operating a searching MAD, infra-red linescan or dropping free-floating sonabouys will plot a course on the Ops Map in the normal manner, but must note that his speed will be reduced significantly, when actually in the search mode. This procedure must be marked alongside the aircraft's track plot on the chart, to enable the umpire to see what is going on, simply by reference to each player's charts. With regards the dropping of sonabouys by fixed wing aircraft, players should note the exact positions of each drop, on the Ops map using a red pen, and noting the exact time of drop. The sonabouy is said to commence searching immediately, and is said to be effective for a maximum period of 48 hours, after which time its power supply fails. Therefore, any submarine coming within range of the sonabouys detection devices, can be found out up to two days after the initial drop. However, the aircraft dropping the sonabouy must maintain contact with it, in order to receive the sonabouys onward transmitted signals. Therefore, if there is no unit within the nine mile range of the sonabouy, to collect and process the signals received, then the umpire will not credit the searching player with a contact, and consequently the submerged vessel will escape detection. The umpire should of course, keep a careful record of the number of

sonabouys an aircraft has dropped, so as to know when the aircraft has exhausted its supplies.

When an umpire decides, by reference to the various equipment in use, that a contact has been made, he should then roll two dice and should the efficiency factor of that particular sonar system be equivalent to or less than the amount of the dice roll, he should notify the searching player that a contact has been made. If it is an active sonar system which has made the contact, the umpire should also notify the detected player that his position is now known to the enemy, as the player who has been spotted is said to have detected the active search signals of his enemy's unit. If however, a passive system obtains the contact, then the detected player is not informed, as he would have no way of knowing that he has in fact, been found out.

As regards radar, the situation is somewhat simpler, as radar is usually more effective than sonar, and consequently does not need to use the efficiency factor system in order to confirm a contact. The normally accepted system for this item, is that should a vessel or aircraft be within the range of an enemy unit's radar, then it is automatically detected, and positions of the contact are



Although technically classed as escort rather than ASW ships, Frigates such as the Voge are better armed and equipped than most destroyers. They are supposed to operate with the SH2D LAMPS choppers, but in this shot it appears that a CH53 ASW helicopter is in use! A rather interesting shot this one if you study it closely!

notified to both players, provided of course that the said radar is in fact in operation. The reason that both sides are informed of radar contacts is because as with active sonars, the use of radar gives ones position away. One may find therefore, that it is advisable not to use radar in certain circumstances. Radar ranges differ on the various systems in use, but as a generally accepted norm — air search radar is effective over an area of about 300 miles radius (depending on the altitude of the contacts), and sea search radar is usually effective at up to about 70 miles for large ship contacts, down to about 30 miles for Frigate size vessels. Additional details on the various ranges of the differing types, can be found in *Janes Weapons Systems* as indeed can all the available data on Sonars etc.

Having covered most of the basic items, we shall now take another look at the explanatory game as commenced in last month's *Airfix Magazine*, and see how the various equipment is operated in a small wargame segment. We pick up the game at 13.00 hrs, where we left off last month, with the pieces in the position as shown at that time.

At 13.00 hrs, Invincible and Leander split



Two converted Airfix models, both from the Airfix 'Tiger' kit, are these ASW Helicopter Carriers/Cruisers the Blake (C99) and the Tiger (C20). Each is capable of operating up to four Sea-King ASW Helicopters.

up, and *Invincible* launched seven Sea-King ASW Helicopters to perform AS sweeps in all directions. From the track of H2, we can see that a contact was in range of its first sonar 'dip' at 13.10 hrs, and as such the umpire rolled the dice and established that a contact had been made. Consequently, the player called up H3 to assist in the search and destruction, and a period of tactical play ensued, involving the two Sea-Kings and the two Echo II submarines. However, at 13.40 hrs, they left the area covered by our Ops chart, and so we leave them and move on to H4, which at 13.15, makes contact with yet another submarine, moves position, and picks up a confirmed contact at 13.18. He then moves to a position which he believes to be ahead of the submarine and prepares an attack, but unfortunately, due to an unfavourable dice throw, his scan at 13.22 fails to confirm a contact, and the Soviet submarine escapes from his clutches.

Meanwhile, further to the North, the fleet sub *HMS Swiftsure*, has gained a

favourable contact with a hostile unit, and is moving in for the kill. At 13.40 *Swiftsure* fires homing torpedoes at the Soviet 'Charlie'

| Type of construction | Points allowed | Usual types of vessel |
|----------------------|----------------|---|
| Ultra-Light | 25 | Small high speed eg, MTB's etc |
| Medium-Light | 50 | Fast smaller vessels, MCMV's etc |
| Light | 100 | Steel built fast frigates etc |
| Robust/Commercial | 150 | General commercial standard |
| Heavy commercial | 200 | Tugs, Trawlers, etc |
| Partially armoured | 300 | Cruisers, etc |
| Very Heavy/Armoured | 400 | Icebreakers & armoured less than 6in |
| Fully Armoured | 600 | Fully armoured ships with armour of over 6in thickness. |

class sub following the tactical firing principles discussed last month, and records two hits which effectively put paid to the Soviet unit. The second 'Charlie' class sub which broke away at 13.00, has however, also been detected by Helicopter H10 from *HMS Blake*, which launches an unsuccessful attack. They immediately lose sonar contact, which allows the 'Charlie' class to close *Blake* and fire her own torpedoes at the Hel-

icopter carrier. Due to badly projected tracks, the sub only manages two hits out of the four torpedoes fired, but, these are sufficient to cause *Blake* severe damage, which causes her to sink later.

One can notice from the Ops map, that none of the ships actually received a sonar contact of their own, this being because successive dice throws made by the umpire when vessels came within range, failed to achieve the throw required, and so under the EF factor, detection failed, although subs were frequently within the required sonar ranges.

Obviously, different players will put different interpretations on various manoeuvres, and to heighten the involvement in

the game many more facets of play may be introduced according to personal choice, such as fuel calculations, logistics, static underwater detection devices and satellite observation of sea surfaces etc. The list of possibilities is indeed endless, and players must increase their own level of enjoyment depending upon the amount of research they are willing to undertake, using various well known reference books as guides.

Royal Air Force Harrier Squadron Markings

S.J. Hazell adds a touch of colour to this aircraft



Harrier GR1 XV804 of 233 OCU in July 1971, with the grasshopper nose emblem and with the last two figures of the serial number repeated above the fin flash in red with a thin white outline.

craft were dispersed for further research, flying to establishments both at home and abroad.

Whilst the Kestrel trials were under way at RAF West Raynham both NATO and British government policies were changing. The definitive VTOL combat design was to have been the Hawker P1154 but for numerous reasons work on the whole project was terminated in 1965. As a result of this cancellation, yet another variant of the P1127 was proposed as a less complex and expensive alternative to the P1154 and it was this aircraft, now named the Harrier, which made its first flight on August 31 1966. The basic marks of the aircraft were the Harrier GR1 and its two-seater version the Harrier T2, but during the type's development the fitting of the more powerful Pegasus 103 engine resulted in the Harrier GR3 and the twin

seater Harrier T4. In addition, there were other modifications introduced during the type's service career, the most noticeable to date having been the installation of a passive Radar Warning Receiver aerial on the fin and tail boom, a Laser Rangefinder and Marked Target Seeker in a lengthened nose fairing and, on some of the two-seaters only; a heightened tail fin.

RAF Wittering, Northamptonshire, was chosen as the Harrier base for home based units and it was here that the Harrier Conversion Team was established in 1968 to prepare personnel for the delivery of the aircraft. The first Harrier GR1 was delivered on January 1, 1969 but it was not until July 1970 that Harrier T2s began to arrive at RAF Wittering. Initially it was the conversion team's task to train sufficient ground and air crew for the formation of the Harrier Conversion Unit, and once Harrier deliveries had gained momentum the HCT was re-named accordingly. Eventually, on October 1 1970, the HCU assumed its present identity of 233 Operational Conversion Unit, by which time it had both Harrier GR1s and T2s on strength.

Although the majority of Harrier units were to be assigned to RAF Germany the first squadron to form was 1 Squadron at RAF Wittering, which officially re-equipped with Harrier GR1s in July 1969. To begin with, the squadron was tasked with carrying out the front-line evaluation of the Harrier, but once this was completed the unit took up its operational role of providing tactical support for the transport and helicopter squadrons of 38 Group, RAF Strike Command.



XV747 '29', a Harrier GR1A of 233 OCU in September 1974 with the wildcat nose emblem and a pale blue fin code.

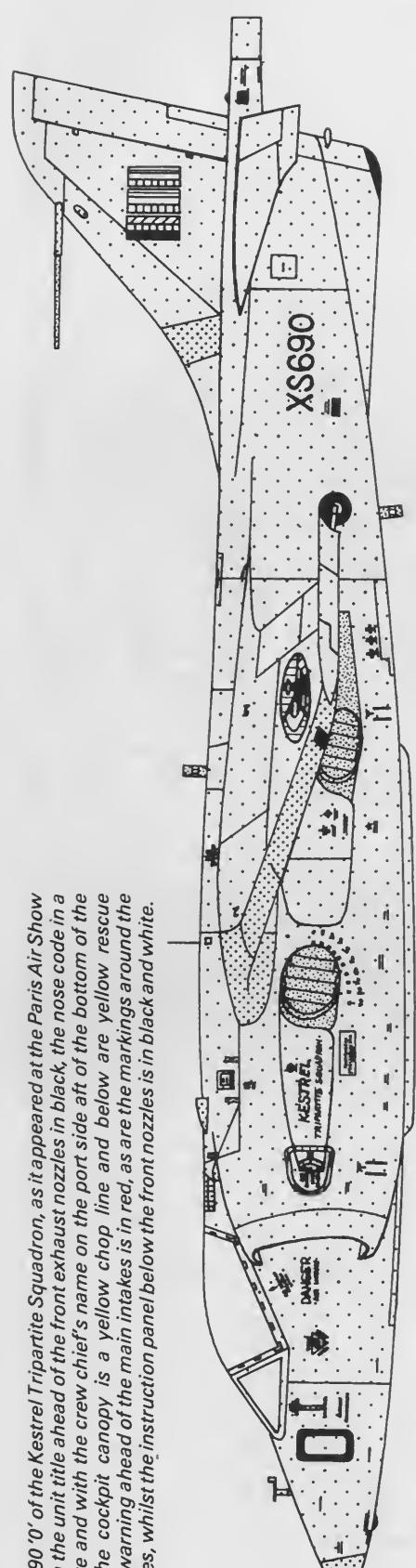
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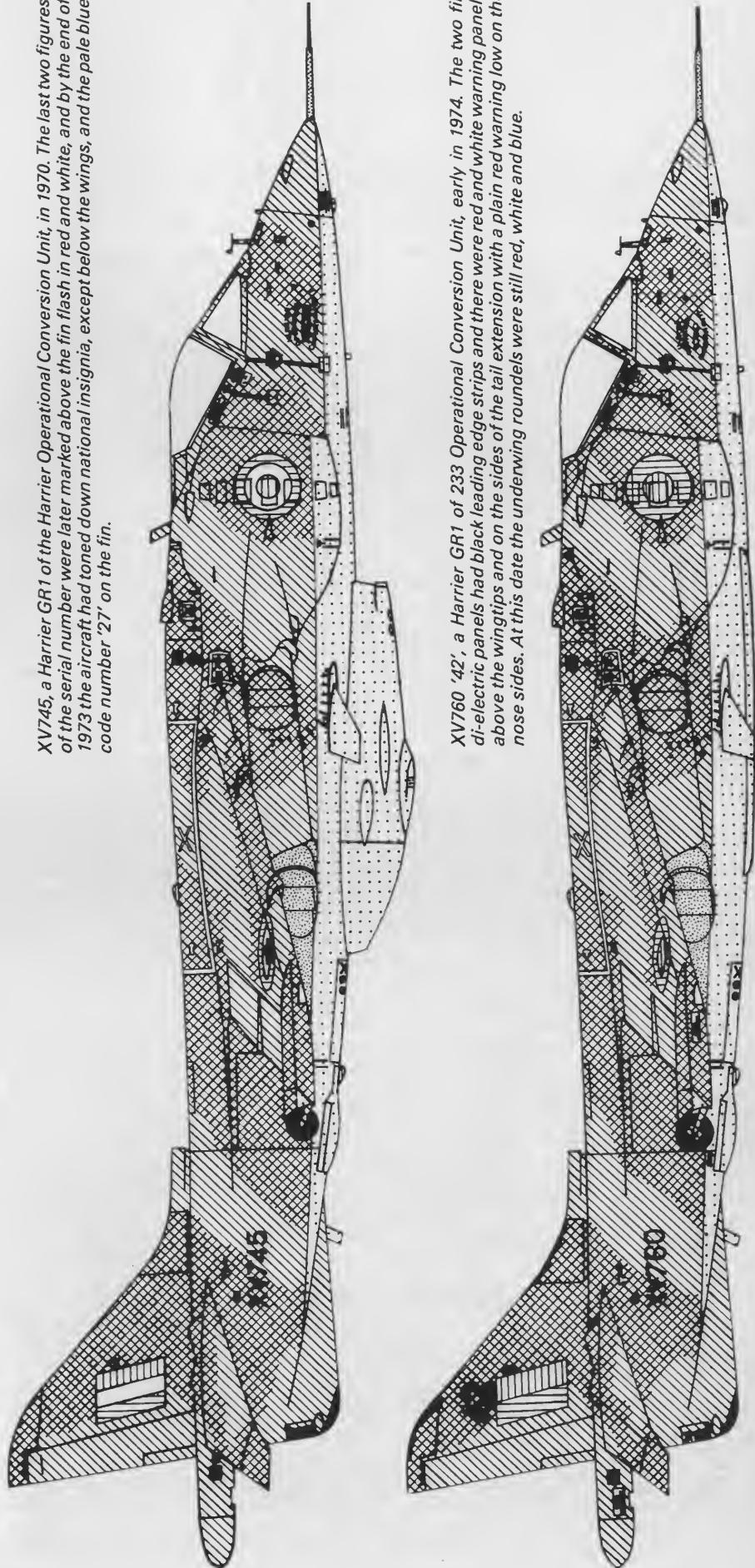
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Kestrel/FGA1 XS690 '0' of the Kestrel Tripartite Squadron, as it appeared at the Paris Air Show in June 1965, with the unit title ahead of the front exhaust nozzles in black, the nose code in a square-style figure and with the crew chief's name on the port side aft of the bottom of the nose code. On the cockpit canopy is a yellow chop line and below are yellow rescue instructions. The warning ahead of the main intakes is in red, as are the markings around the smaller side intakes, whilst the instruction panel below the front nozzles is in black and white.



XV745, a Harrier GR1 of the Harrier Operational/Conversion Unit, in 1970. The last two figures of the serial number were later marked above the fin flash in red and white, and by the end of 1973 the aircraft had toned down national insignia, except below the wings, and the pale blue code number '27' on the fin.

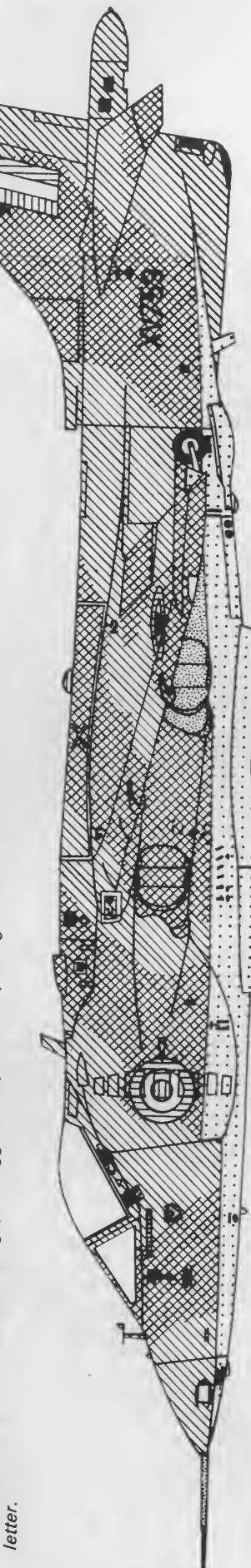


XV760 '42', a Harrier GR1 of 233 Operational Conversion Unit, early in 1974. The two fin di-electric panels had black leading edge strips and there were red and white warning panels above the wingtips and on the sides of the tail extension with a plain red warning low on the nose sides. At this date the underwing roundels were still red, white and blue.

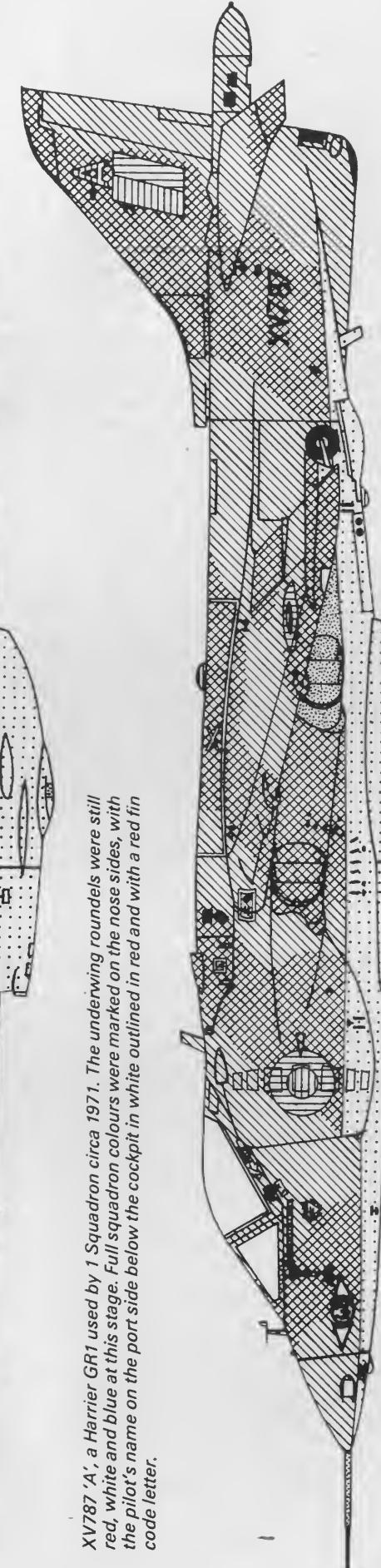


1 Squadron Harrier GR1 XV753 'Y' in the summer of 1970. The fin badge was the rampant lion of RAF Wittering marked on a white disc, aft of which was a white code letter outlined in red. 'E' marked on the front of each wingtip outrigger, this presumably being an earlier code letter.

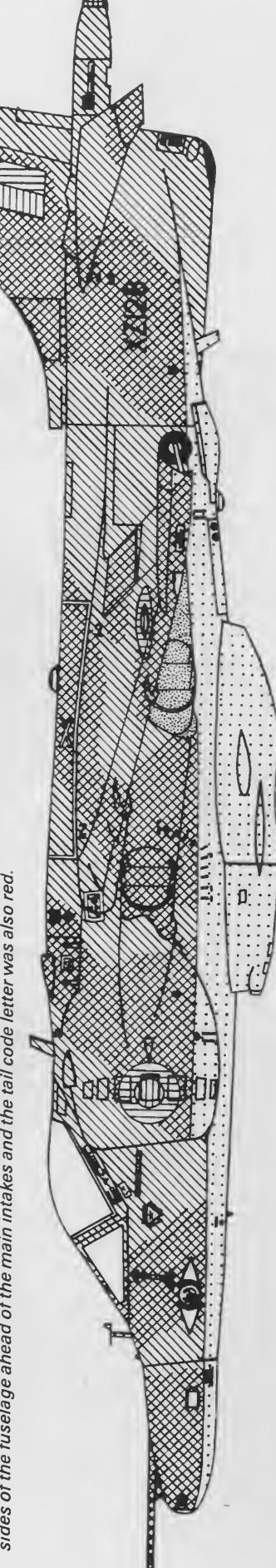
Colour key on next page



XV787 'A', a Harrier GR1 used by 1 Squadron circa 1971. The underwing roundels were still red, white and blue at this stage. Full squadron colours were marked on the nose sides, with the pilot's name on the port side below the cockpit in white outlined in red and with a red fin code letter.



Harrier GR3 XZ128 '15' of 1 Squadron in September 1976, before the camouflage was extended to cover the undersurfaces. Red and white warning panels were marked on the tail extension and above the wings with a plain red warning low down on the sides of the nose laser fairing. Besides full squadron nose colours the pilot's name was marked in red on both sides of the fuselage ahead of the main intakes and the tail code letter was also red.

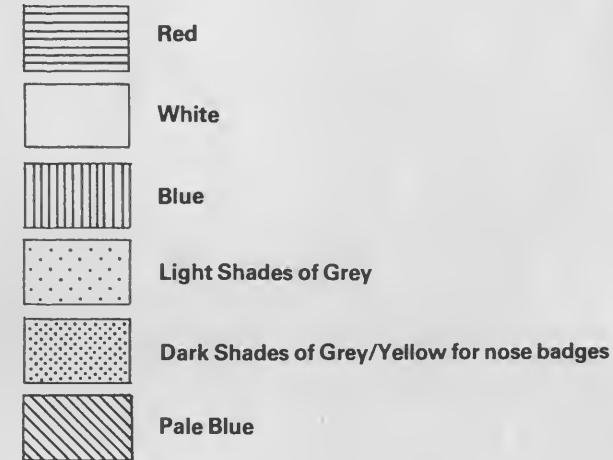
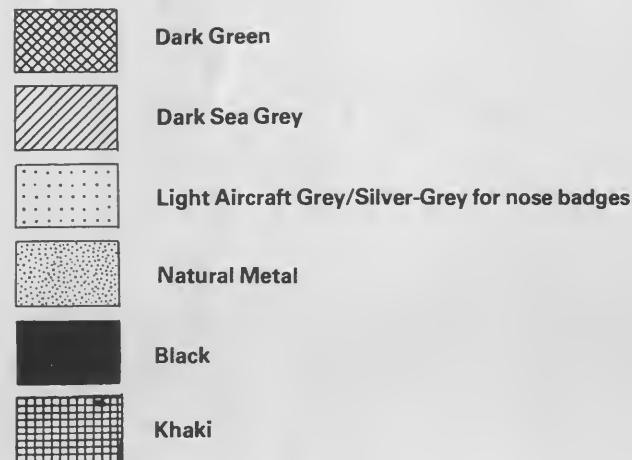


HARRIER OPERATIONAL CONVERSION UNIT

The nose colours carried by 1 Squadron aircraft often vary in detail, but a typical example is shown here. It consists of a white disc edged in red, with similarly coloured flanking triangular bars. The central emblem is a red 1 outlined black, with yellow wings also outlined black. Once the basic markings have been applied using templates more intricate details are often added, depending on the individual painter's skill.



The current nose emblem of 233 OCU consists of a coloured wildcat head, largely in black and mid grey, on a pale blue disc flanked by bars of red and mid grey to the left and black and yellow to the right, each outlined in pale blue. The detail colours of the wildcat vary in style and colour between aircraft.



Kestrel Tripartite Squadron aircraft markings

All nine Kestrel FGA1s were delivered in a basic finish of dull Natural Metal overall with certain areas painted in various shades of Grey. Standard British serial numbers were applied in Black to the after fuselage and below each wing where the letter portion of the number was positioned above the numerals. In order to reflect the tri-national character of the unit, hybrid 'national' insignia were applied to the wings and fin only. The rounded marking consisted of a disc divided into coloured segments each separated from the others by a thin White line. Each segment represented one of the countries participating in the trial and consisted of Red, White and Blue arcs to the uppermost segment, a Light Blue right hand segment with a small US star emblem on it, and a Black, Red and Yellow left hand segment on which was marked the Black and White German cross. On the tail, the fin flash consisted of vertical bars of Black, Red and Yellow, Red, White and Blue, and Red, White and Blue, with each block of three colours being edged in Silver.

The inevitable exception to these markings was XS688, the first Kestrel FGA1, which had the wing roundels applied as mirror images of each other to begin with.

Soon after delivery to RAF West Raynham the last figure of the aircraft serial number began to be painted in Black on the nose sides as an individual aircraft code number. Early in 1965 this was joined by the name of the aircraft crew chief which was marked in Black low down on the port side of the nose and eventually the unit's title was also painted in Black but this time on the side of the fairing ahead of each front exhaust nozzle.

Harrier aircraft markings

To begin with, Harriers were delivered in the standard Strike Command camouflage finish of gloss Dark Sea Grey and Dark Green on the upper surfaces and below the leading edges, with Light Aircraft Grey undersides, but it was not very long before matt finish paints were introduced to replace the gloss paints. In order to improve the camouflage effect on low flying aircraft manoeuvring over rugged terrain, the

Grey and Green camouflage began to be extended over all of the undersurfaces as well from 1975 onwards, this finish ultimately being applied to all new aircraft as they left the production line. The various di-electric panels were coloured in shades of Khaki-Green and initially the exhausts were all Natural Metal, although later the front (cool air) exhausts were also camouflaged. Miscellaneous marks applied to the basic finish were generally in dull colours but the most conspicuous included the Red and White ejection seat warning triangle below the cockpit sides, Red outlines to various intakes and vents and to the no-step area above the wings, and the Black lines below the cockpit sides indicating the positions of the access steps. Quite early in the Harrier's service career, additional Red and White warning panels were applied near the nose, tail and wingtip hot air control vents as a warning to groundcrews.

Aircraft serial numbers were marked in Black, being positioned on the rear fuselage sides and below the wings where the format followed that used by the Hunter with the letter portion of the

serial number being placed above the numerals. National insignia were in the standard Red, White and Blue to begin with, and unlike the Kestrel fuselage, roundels were carried on the Harrier, being positioned on the sides of the main air intakes. From late 1970 the national insignia on the upper surfaces began to be toned down by having the White portion deleted in an effort to make the aircraft less conspicuous whilst hidden in their operational dispersal sites. One of the earliest machines in these modified markings was XV795 'X' of 1 Squadron which was first noted in November 1970. Thereafter all the Harriers were similarly treated and this policy was also extended to cover all of the RAF's tactical aircraft in what was to be a general toning down of all bright aircraft markings. To begin with the underwing roundels were left in their original Red, White and Blue colours but from about 1972 these roundels too were repainted Red and Blue, even though the aircraft undersides remained Light Aircraft Grey. As is always the case however,



XW9223 '49', a 233 OCU Harrier GR3 in the overall camouflage finish adopted in 1975. When seen in July of that year the two di-electric panels on the fin were matt medium green.

early finish included the Harrier GR1s XV744 to XV750 inclusive, all of which were in use at RAF Wittering during the summer of 1969. Once 1 Squadron was established as a separate unit however, it adopted its own squadron markings and the HOCU followed suit. By the summer of 1970, the station badge had been removed from the fin and a Yellow and Black grasshopper emblem applied

last two figures of the aircraft serial number were repeated above the fin flash in Red outlined in White. One of the earliest aircraft noted in this finish was the Harrier T2 XW266 '66' which, on July 1 1971, still had the Red, White and Blue national insignia in all positions.

The next main change in markings came in September 1973 when an aircraft was sent to the São Paulo air show and the opportunity was taken to paint it in the new squadron colours which were then gradually applied to all of 233 OCU's aircraft. Harrier GR1 XV758 '58' was the aircraft in question and the new colours which replaced the grasshopper emblem consisted of a Pale Blue disc on which was a coloured Wildcat's head. The disc was flanked by coloured bars with Deep Red and Silver-Grey to the left and Black and Yellow to the right, each bar being outlined in Pale Blue. On XV758, because of its participation in a foreign air show, the pilot's name was also marked in Pale Blue below the rear of the windscreen on the port side. Unit markings were again modified when, in December 1973, the abbreviated serial number on the fin was replaced by an individual aircraft code number marked in Pale Blue. These code numbers were allocated to all of Wittering's aircraft, 233 OCU's block running from 20 upwards, but whereas these new codes were applied relatively quickly the new



Amongst the two-seater Harriers operated by 233 OCU was XZ445 'Q', the Harrier T4 funded by the Royal Navy to assist in the training of Sea Harrier pilots. It carried the standard RAF finish and when noted in May 1980 had full OCU nose colours and a pale blue fin code. As was the case with most two-seaters the tip of the elongated tail boom was painted dayglo to help reduce accidents when the aircraft was parked amongst the shorter single-seaters.

the repainting programme took some time and it was not uncommon to see aircraft flying as late as 1975 still with Red, White and Blue underwing roundels.

For all the aircraft colours the finish was a high speed gloss to begin with, but soon an overall coating of matt varnish began to be applied pending the availability of the definitive matt paints. These were introduced in an effort to eliminate light reflections from aircraft dispersed on the ground, reflections which, on sunny days, could easily give away the position of an otherwise well hidden aircraft.

233 Operational Conversion Unit

Prior to the official formation of 1 Squadron in July 1969, 233 OCU's forerunner, the Harrier Operational Conversion Unit, shared its aircraft with the embryo 1 Squadron and as a result the only marking carried by the newly delivered Harrier GR1s was the heraldic station badge which was marked above the fin flash. Aircraft recorded in this



XV759 'E', a 233 OCU Harrier GR3 in June 1977. It was camouflaged overall and had the laser nose fairing and the tail ESM equipment.



Harrier GR1 XV755 'L' of 1 Squadron in March 1970. It had an overall gloss finish to its paintwork and the lower di-electric panel on the fin was edged in off-white. The heraldic badge of RAF Wittering was marked on the fin, 1 Squadron's standard colours low on the nose sides and a black code letter on the wingtip outriggers only.

nose colours were not, so it was not unusual to see various combinations of nose emblems and fin codes for some time after these markings first appeared.

Typical examples of 233 OCU's Harriers have been XV759 '59' and XV762 '62' which both appeared in October 1973 with the nose grasshopper and Red and White fin codes; XV760 '42' in early 1974 had the nose grasshopper and Pale Blue fin code, and XV747 '29' and XV756 '34' both of which, in September 1974, had the wildcat nose emblem and Pale Blue fin codes. All of these aircraft had Light Aircraft Grey undersides and none had the tail ESM or laser nose modifications. More recent examples with the overall camouflage finish have included XV762 '44' which, in October 1976, lacked the tail ESM and the LRMTS nose fairings, and XV748 '37' which did have these modifications when noted in February 1977.

The most recent change to the unit's markings came towards the beginning of 1977 when the fin code numbers were replaced by individual code letters which were also marked above the fin flash in Pale Blue. Aircraft in this finish, which is still current, have included the Harrier GR3s XV753 'C' and XV759 'E' in June 1977 and XV760 'F' in June 1978, and Harrier T4s XW268 'U' in May 1978, XW927 'Y' in May 1979 and XZ445 'Q' in May 1980.

1 Squadron

When 1 Squadron formed at RAF Wittering as a separate unit it drew its aircraft from those hitherto used by the



XZ128 '15', a Harrier GR3 of 1 Squadron in June 1979. The fin di-electric panels were khaki-brown with black leading edge strips, and the pilot's name was marked ahead of the main intakes in red, on both sides of the fuselage.

with XV92 'D' which lacked the fin badge. The Harrier GR1 XV753 'Y' was something of a hybrid when noted in 1970, for it lacked the nose colour but had the pilot's name on the port side of the fuselage and the usual fin code. Also, instead of the heraldic station badge on the fin, it carried a White disc on which was marked the rampant lion emblem of RAF Wittering; by September of that year however, it had assumed the full squadron markings without any fin badge.

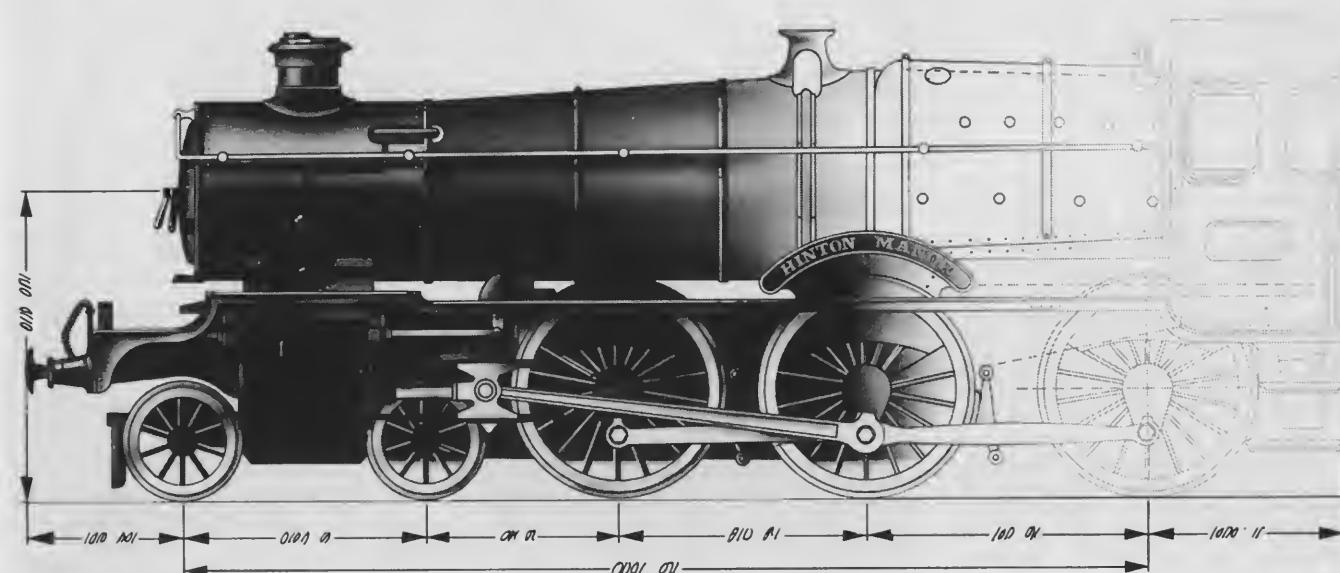
When the Red and Blue national insignia were introduced from about November 1970, thought was given to toning down the rather conspicuous fin codes as well, and XV795 'X' made a brief appearance late in 1970 with its fin code marked in adhesive Dayglo strip. The eventual colour chosen for the fin code however, was Red, and from about the spring of 1971 aircraft could be seen with the Red code and either Red, White and Blue national insignia as on XV749 'K' in May 1971, or else with the new Red and Blue markings as on XV795 'F' in the autumn of 1971. Individual aircraft code letters continued to be used until December 1973 when all of Wittering's Harriers were



In July 1977 1 Squadron also operated Harrier T4 XW271 '17' for continuation training. It had the overall camouflage finish with standard squadron markings but did not carry any crew names.

Letters began to be marked on the fronts of the wingtip outriggers, as on XV757 'N' in February 1970 by which time its fin badge had been removed. From about June 1970 the individual aircraft code letter was repositioned on the fin sides in White outlined in Red, the code being placed behind the station badge where this was still carried. At more or less the same time, the pilot's name began to be marked in White with Red trimming on the port side of each aircraft below the windscreens. A typical aircraft in this finish was XV746 'J' in use in the autumn of 1970, together given code numbers, 1 Squadron's machines initially taking the block 01-19, and these new codes continued to be marked in Red above the fin flash. Examples included XV788 '11' which, in August 1974 lacked the pilot's name on the forward fuselage, together with its contemporaries XV787 '02' and XV795 '05'. Unlike 233 OCU which changed code letters, 1 Squadron retained its numbers up to the present but with an extended range to take account of the squadron's increased complement. As a further toning down measure, the pilot's name, when marked at all, began to be painted in plain Red letters ahead of the main intakes on either the port or starboard side, or even both sides of the fuselage. Aircraft recently operated by 1 Squadron have included XZ128 '15' in June 1979, with the pilot's name on both sides of the fuselage, XV756 '26' in September 1979, with the pilot's name on the port side only, and XZ964 '09' which, in June 1980, also had the name on the port side only; all of these aircraft featured the overall camouflage finish with tail ESM and nose LRMTS fairings.

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Omnibus Gallery by Mike Fenton. *Patrick Stephens Ltd, Bar Hill, Cambridge.* £4.95. Mike Fenton sets out to record his own fascination of buses from all over the British Isles as well as abroad and he has come up with a book that is not only a personal pictorial account of the different varieties of buses but is also a very informative piece of works regarding body-work, chassis details, usage etc. Each page contains a large photograph with the caption underneath, which saves the reader the aggravation of turning to the back every time he/she is searching for the correct information.

Hannibal's Campaigns, by Tony Bath. *Patrick Stephens Ltd, Bar Hill Cambridge.* £7.50.

'Hannibal was always producing something new and compared to the plodding work-horse Generals of Rome, he was a purebred stallion'. This is the way the author sees his particular hero — a man of great military strength and political acumen who he believes should be favourably compared to Alexander the Great. Although the book is essentially about Hannibal's campaigns, the background and general history of Carthage has been sketched in to show how it achieved such prominence and was a force to be reckoned with, by the Romans. To the general historian this particular account may seem a little dull, but to someone with an interest in wargaming who would like to know more about the events behind the great battles, this could be of interest.

The D-Day Landings, by Phillip Warner. *William Kimber & Co Ltd, 22a Queen Anne's Gate, London SW1H 9AE.* £9.95

Phillip Warner is well known for his books of personal account of famous actions, linked with background text to amplify or illuminate points in the narrative which are now obscure or needing specialist knowledge to interpret. His *Alamein* is especially well remembered, though this book is not so good.

It is divided into sections such as 'Invasion from the Air', 'the Navies', 'RAC', 'Infantry' etc, has a spacious Introduction, the editing is abysmal, some quite common abbreviations are carefully explained (or badly so), whilst more unfamiliar ones are ignored.

The text cannot have been checked, for on page 75 we are treated to 'Within minutes our leas were away and forming up with the others of our J2 division . . .' shouldn't this be LCA's? (Landing Craft Assault). Later we have an account of a Lieutenant in the 1st East Riding Yeomanry within the 'Infantry' section (1 ERY were a Sherman unit of 27 Armoured Brigade).

There are references to Churchill flails when we know they were Sherman Crabs, yet there is no footnote pointing out that memory is faulty or knowledge limited at the time. There are many references to Beach Groups within the text, but the Orders of Battle at the back of the book make no mention of them. (Reason: they are hidden within the L of C units which were established as soon as the landings were firm). Again a note to this effect would have been helpful.

A very uneven book, but one that must be of value to any historian or modeller as it adds considerably to our knowledge of the experiences of that great day. If only there had been more care in its presentation, it would have been very much better.

A Drop Too Many, by Maj-Gen. John Frost. *Cassell Ltd, 35 Red Lion Square, London WC1R 4SG.* £8.95

For many people 'Johnny' Frost will always be the defender of Arnhem bridge but he learned his trade in the hard school of Tunisia and Sicily against the Hermann Goering Division and the Fallschirmjaeger and commanded the first ever British Parachute Regiment action — the Bruneval Raid.

This is his account of his wartime service, from secondment to the Iraq Levies from his own regiment, the Cameronians, to his joining the Parachute Regiment and rising to command the 2nd Battalion.

Running like a thread through the book is the opinion that the Allies had little idea how to best use airborne forces. The first drop of 2 Para at Depienne in Tunisia to take out a series of landing grounds, and then link with 1st Army, hit thin air and the battalion was all but cut to pieces by enemy armour and motorised infantry whilst the planned thrust by 6 Armoured Division to join hands with them had been cancelled!

An opportunity to employ the Para Division after Operation *Fustian* (the drop at Primasole Bridge) to seize the Catania plain was not tried and in Frost's opinion, Operation *Market-Garden* failed because the RAFs DZs and timings were accepted; these being too far away, too late and on only one side of the objective. Also the 82nd Airborne were told to take Groesbeck Heights first, and the Nijmegen bridge later. A mistake in priorities that was to seal the fate of the troops at Arnhem.

These opinions are borne out by other sources. Notably *The Wooden Sword* by L. Wright (Elek, 1967) who was a glider expert.

The author does not dwell on his misfortune overmuch but concentrates on the actions of 2 Para, who fought for most of the war as crack infantry in the line, first in Tunisia and then Italy before winning fame at Arnhem.

He has some very good sketches of his men such as Freddie Gough of the Recce Squadron (also well portrayed in *The Wooden Sword* and *Remember Arnhem* their history) and 'Bombs' Panter of Support Weapons plus many more. A real must for anyone keen on the 'Red Devils'.

Panzer in the Balkans and Italy, by Bruce Quarrie. *Patrick Stephens Ltd., Bar Hill, Cambs.* £3.95

A most interesting title this one, covering the forgotten zones of the Balkans and Italy. As the publishers rightly suggest, most of the photos are new to UK readers and will provide military modellers with many useful ideas, ranging from impressed French tanks in German service in the Balkans to a

converted Carden-Lloyd carrier in Italy. A very useful reference. This is No 19 in the 'World War 2 Photo-Album' series.

Aero-Armor Series, Vols 12 and 13. *Aero Publishers, in UK from Arms and Armour Press, Lionel Leventhal Ltd., 2-6 Hampstead High Street, London NW3.* £2.50 each

Arms and Armour Press are now the UK distributors for the very good American 'Aero-Armor' series of books from Uwe Fiest, and these two recently available titles are no exception to the rule of very well produced books. Vol 12 deals with a variety of vehicles including from the World War 2 Moebelwagen, Sdkfz 140, SdKfz 301, the Goliath and from the current arsenal of the West German Army, the Marder; Vol 13 also concentrates on the present Bundeswehr armour and includes details on both the Leopard 1 and 2, the Jpz 45 and the Marder again. Both books are laid out in the normal format for Aero-Armor which is photos with captions and paragraph information sections and of course there are the full colour plates by Uwe Fiest as well.

The Harness Horse, by Edward Hart. *Shire Publications Ltd, Cromwell House, Church Street, Princes Risborough, Aylesbury, Bucks.* 95p

Shire Publications are a company that publish a wealth of small, low priced books, all excellently produced and every so often a title appears that is relevant to model making. This new title *The Harness Horse* is one such book, which provides both photos and not inconsiderable text detail on a variety of horse drawn vehicles ranging from small pony carts to dress coaches, the harnesses used and of course detail on the horses. There is much here to stimulate the experienced modeller looking for a challenging subject. A highly recommended title.

British 4-Wheeled 30cwt, by Mike Connifford. *Published by Inkpen Art Productions. Distributed by Kristall Productions Ltd., 4 Surbiton Hall Close, Kingston, Surrey.* £1.25 plus 25p postage.

Latest from Inkpen is a particularly interesting addition to the series for it covers various lesser known 30cwt, none of which would fill a monograph in its own right, but all of which are of great fascination to modellers and military enthusiasts. As usual there is a generous selection of rare photos, 1:76 scale drawings, and data and historical notes. Certain types like the Austin K30 and Bedford OX could be converted from the existing parts in the two RAF sets made by Airfix. The others would need scratch-building except for the Ford WOT8 for which a resin Gramodels kit exists. Commer Q2, Bedford MSC, Dennis AM 30/40, Fort WOT3, and the Ford E018T are among the other types covered.

Charge, by Peter Young. *Athena Publications, 20 St Mary's Road, Doncaster, South Yorkshire.* £1.25

For readers who are involved in wargaming, this pamphlet may be of use. Terry Wise, himself a keen wargamer, decided to publish a copy of Charge rules because he felt that they had had a lasting effect on his own approach to this highly complex game. They have been rearranged slightly from the original book Charge, but still keep to the original spirit. Other military books (new and second hand) plus information sheets on heraldry, military flags and vehicle markings are also available. For more information write to the above company.

Mobile radar, since at that time this equipment was very secret.

I have a recollection that there were no more than two such units with the RAF in France. These units were rather like the A1 type sets and were possibly based on a 3 ton six wheel Crossley truck that pulled a 4 wheel box type trailer. There was also a generator unit that when in the field supplied the power. The aerial array was of the pole type and when rigged, looked like a curtain. The range was short, about enough to give cover over its 'Maginot Line'.

It is possible that one unit was based near Rheim, the other near Arras. These units were, I think, pulled out very early in the German advance to the coast and brought back to England.

Readers may be interested to know that I founded the Restoration Flight for the West Essex Wing ATC about two years ago when a Meteor NFII ex 29 Sqn was handed over to us. Since then we have taken on loan or on charge, a very nice Harvard, a replica 'Sopwith Pup'. The replica is BE2 ex (BBC) Wings, a replica ME log. We also have next to our workshops on the airfield, a museum, containing early RAF radios (TR2 onwards) German radio equipment, IFF equipment radar etc. There are many kinds of interesting items in the showcases, including some very fine models such as an airship SLII, shot down by a BE2, 39 Squadron RFC operating from the airfield in 1916. There are also many fine Airfix models on display.

A very colourful painting scheme for the Jungmeister would be the one used on Art Yarden's plane (code-lettered N1881). It is impossible to describe this painting scheme, except to say that it involves the use of scarlet and white, with black trimming. More information, and some excellent colour photos of this can be found in *The Great Planes* by James Gilbert (Hamlyn).

Of course, this is not an authentic colour scheme, but if accurately reproduced (for it is rather elaborate!) would make a very colourful and attractive model.

Ben Trigg, Newport, Gwent

Quite right, it is a Bü 133, and not as misprinted by us. Editor

1940 Mobile Airfield Radar (France)

You are quite right in that very few illustrations are available concerning 1940

I was very interested to have my attention drawn to my photograph which appears on page 519 of *Airfix Magazine* July 1981. I well remember the photograph being taken, on, I think, D + 3. We were lying alongside

one of the HQ ships having lunch before going off to position the next ship to be sunk in the line of the Gooseberry.

Some correction should be made to the caption under the picture. It should read 'six months before D-Day etc.' Visits were only possible during the long dark winter nights when there was no moon. Also I did not personally land on the beaches at that time, but we landed an army major and a sergeant who actually gathered the information, and then brought them back to England.

I remember seeing the photograph once, a year or so after Normandy, but since then had completely lost touch with it. I assume from the references that it is now in the Imperial War Museum. I was naturally extremely surprised to see the picture in a modelling magazine. It was very nice to see it again after all these years.

Commander N.C. Glen, Langport, Somerset

Question Answered

In your August issue, Mr. J. Harvey requested colour schemes for a Junkers Ju 52 in Spanish Nationalist colours. May I suggest that the following books could be of some use:

Legion Condor 1936-1939 (German Text), by Ries-Ring Verlag Dieter Hoffman. Although expensive this book contains plenty of good quality photos, mainly of legion Condor machines, but there are also examples of Ambulance, Civil and captured Ju 52s. *Spanish Civil War Airforces* by Christopher Shores, Aircam/Airwar 3. This book contains one air-to-air photo of a Ju 52 in Nationalist markings. The same photo is printed in *Combat Over Spain* by the Duke of Lerma, Neville Spearman along with much background information, some relating to the actual Ju 52 shown. Sadly this book is now out of print although I managed to obtain one through Beaumonts Aviation Literature. The two former books I obtained from Albion Scott Ltd. Finally a book I obtained from Yeovil Library, and which unfortunately I forgot to note the authors or publishers, is called *The Day Guernica Died*. This book contains a few photos of Bombardier's ventral 'Dustbin'.

I hope this letter is of some help.

M.B. Harvey, Yeovil, Somerset



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Jungmeister correction

I noticed that in the July 1981 issue in the article 'Yesterday's Sportsplanes' you refer to the Jungmeister as a Bücker Jungmeister Bul 133. Surely it should be a Bücker Jungmeister Bü-133, as I have found it printed in other references?

A very colourful painting scheme for the Jungmeister would be the one used on Art Yarden's plane (code-lettered N1881). It is impossible to describe this painting scheme, except to say that it involves the use of scarlet and white, with black trimming. More information, and some excellent colour photos of this can be found in *The Great Planes* by James Gilbert (Hamlyn).

Of course, this is not an authentic colour scheme, but if accurately reproduced (for it is rather elaborate!) would make a very colourful and attractive model.

Fred Hitchcock, Epping, Essex

Recognition

I was very interested to have my attention drawn to my photograph which appears on page 519 of *Airfix Magazine* July 1981. I well remember the photograph being taken, on, I think, D + 3. We were lying alongside



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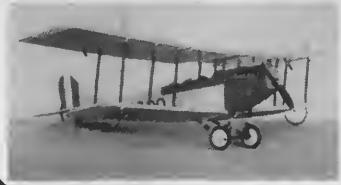
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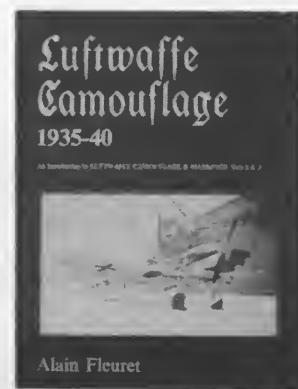


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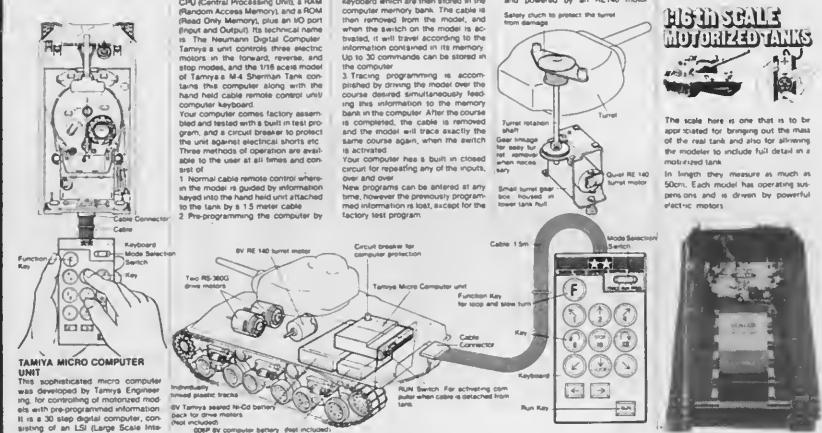
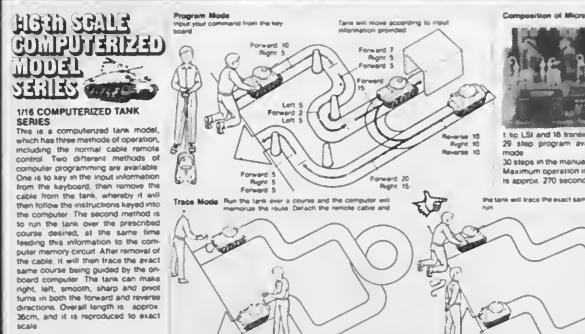
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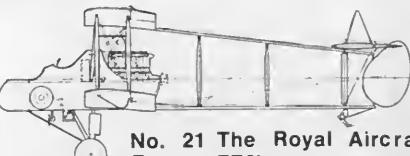
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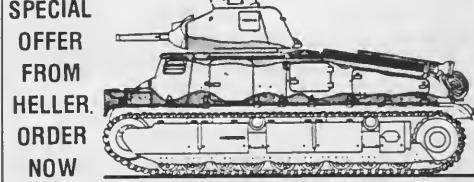
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